

# anatomy for artists CICIUINC GICIUINC GICIUNC GI

The ultimate guide to drawing anatomy in perspective and pose with tomfoxdraws

#### 3dtotal Publishing

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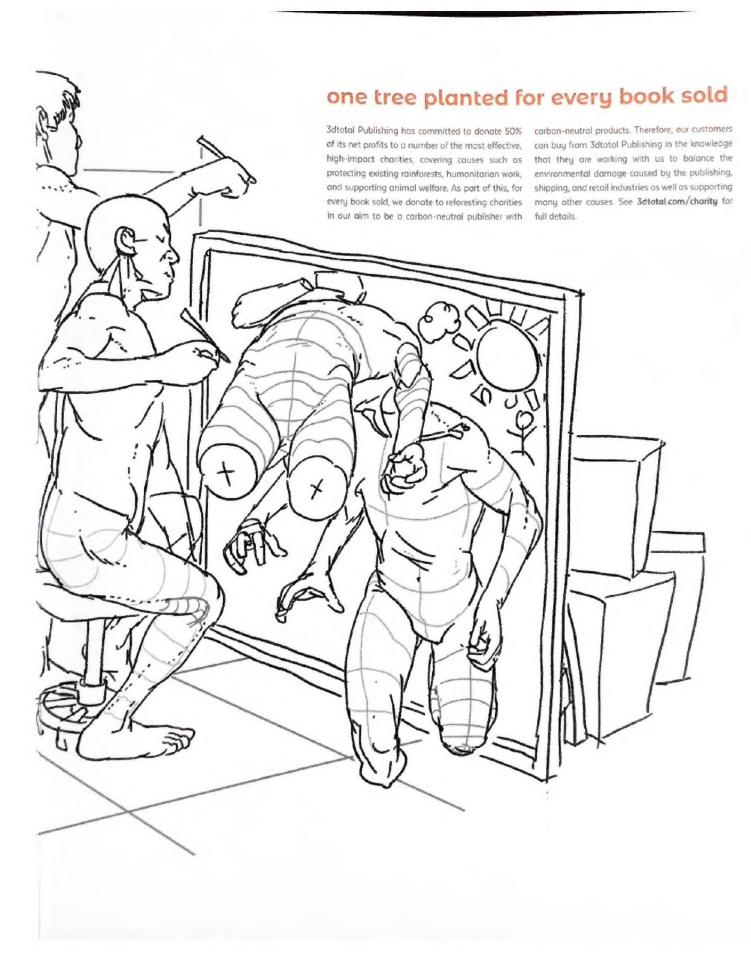
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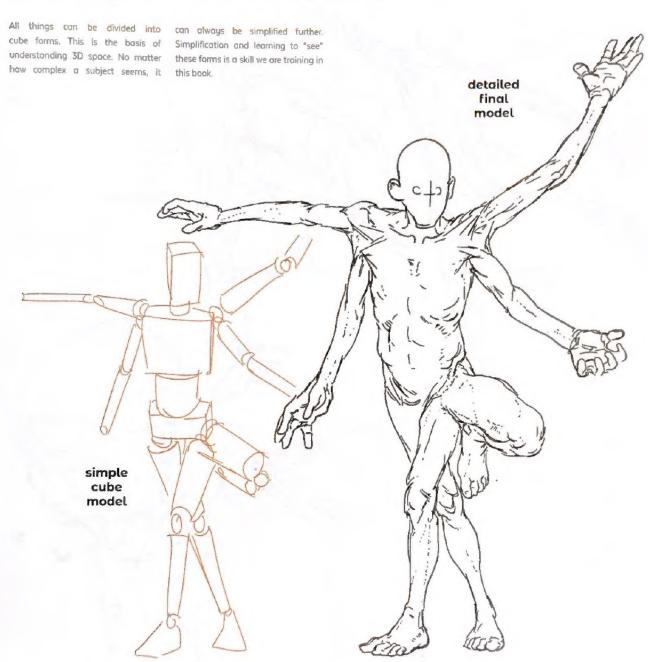


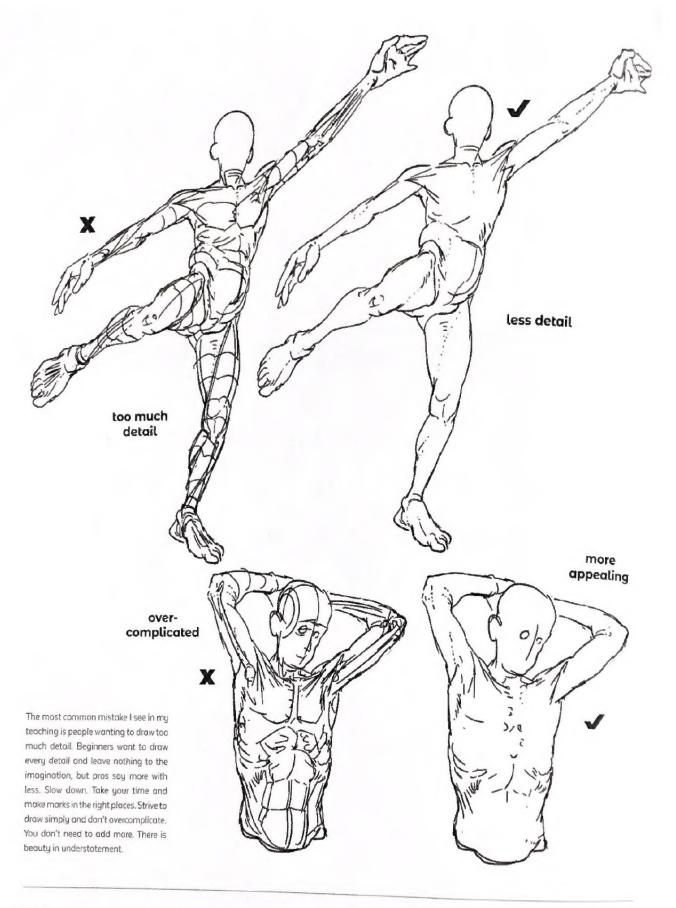


## 

### XYZ Space & form

#### simplification





Remind yourself: More lines isn't always better. More lines doesn't mean your work has more "form," When we say "form" we mean the feeling the viewer has that the subject is physical and 3D. Beginners are unconfident in their decisions, if they're making any, and it shows in their linework, often with multiple lines without clear choices and confidence.

complex line art doesn't make a better drawing

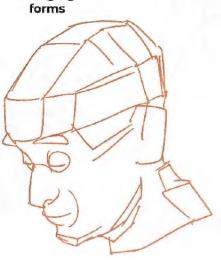


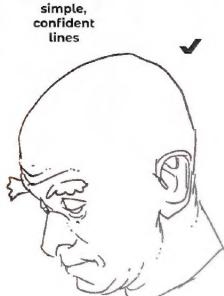
studying

studying basic forms is more important







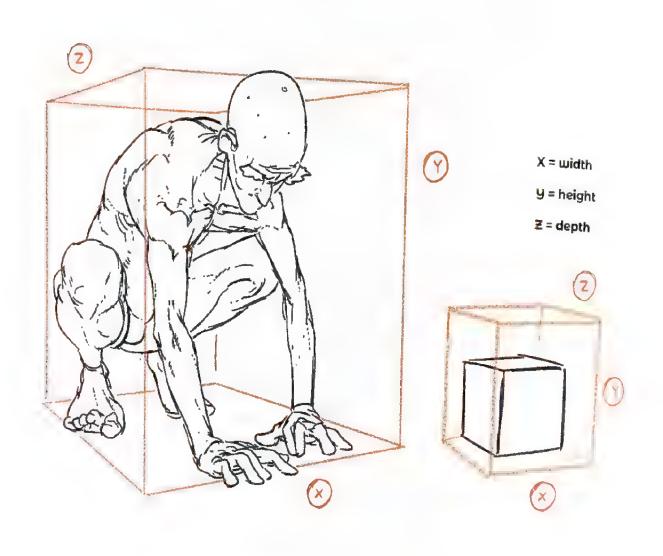


#### x, y & Z

The world around us is a 3D space, and every object exists in it. Every object we see conforms to these three dimensions; width, height, and depth. We can call these the X, Y, and Z dimensions. This is true for simple

forms as well as for something as complex as the human figure. Not only single objects, but whole scenes fit within these dimensions. Try to imagine each object sitting within its because it's easier to learn from! own cube form

As a side note, you'll notice throughout this book that I draw overly large hands and feet. This is intentional, firstly because it's fun, and secondly





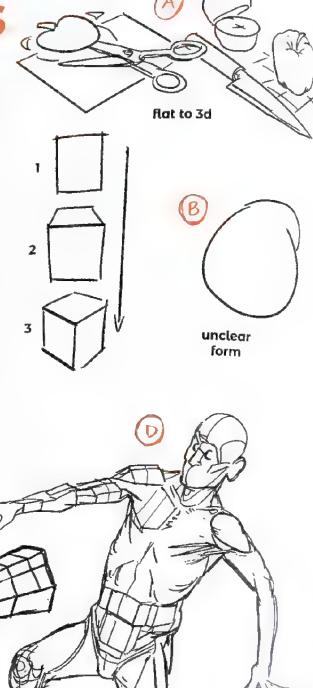
## adding form with planes

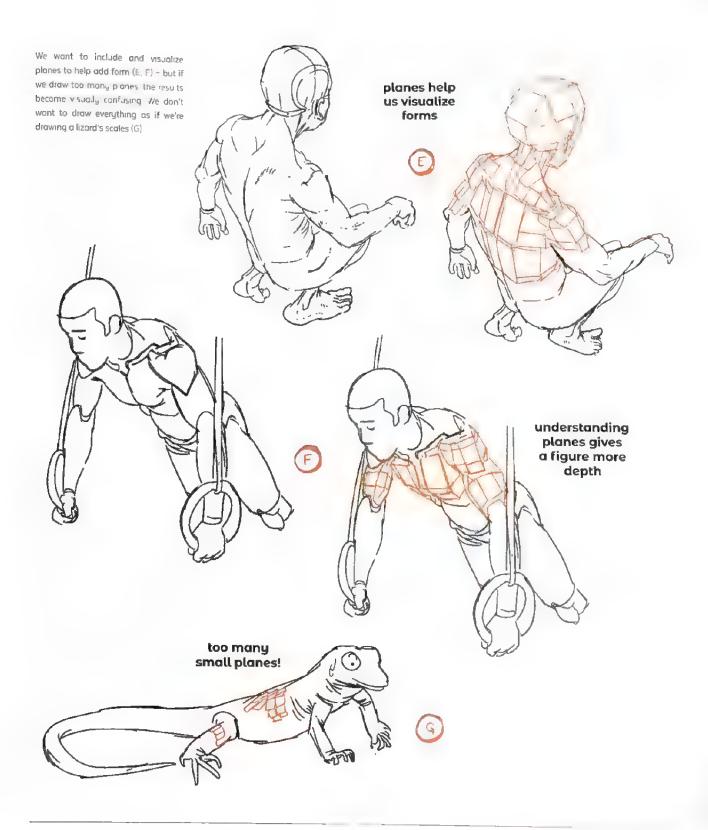
So we know that using all three dimensions is the best way to show form (A, 1-3), but how can we use this knowledge? Look at this bean shape (B). It's not clear what angle we're seeing it from. We want the viewer to feel like they're seeing these objects from a certain position.

The best way is to add "sides" or "planes" to help clarify (C). Aim for at least three planes to represent each dimension (D). Ask yourself, "Does this object have three clear sides? Does it have height, width, and depth?"

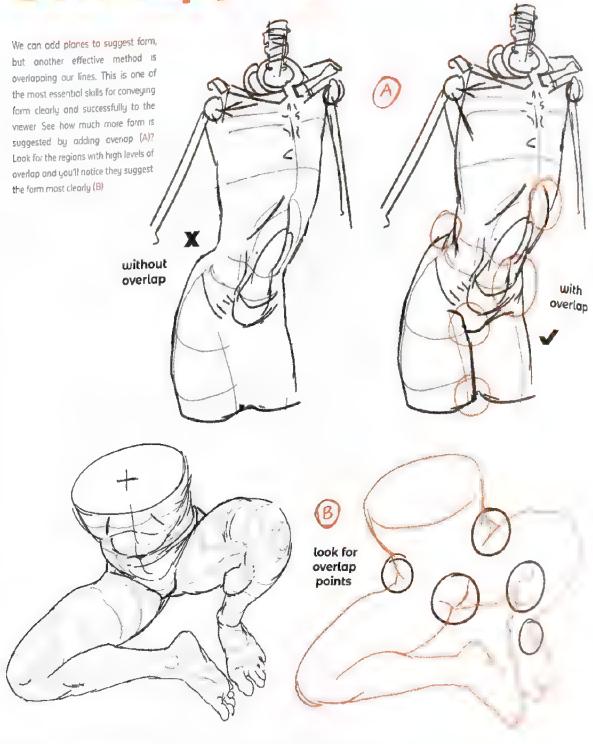
planes give form

at least three planes

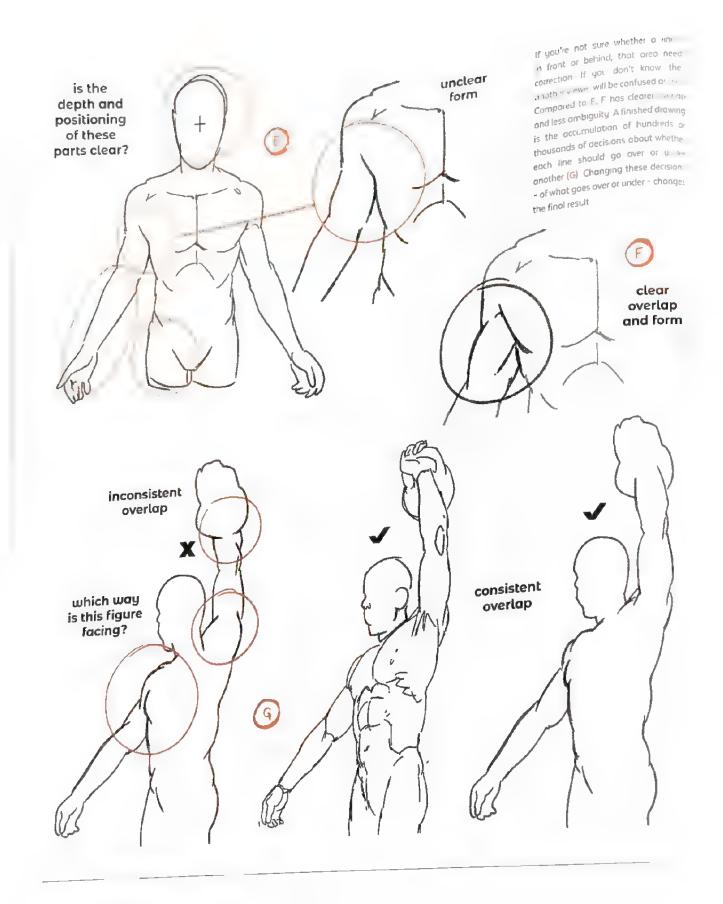




### overlapping forms

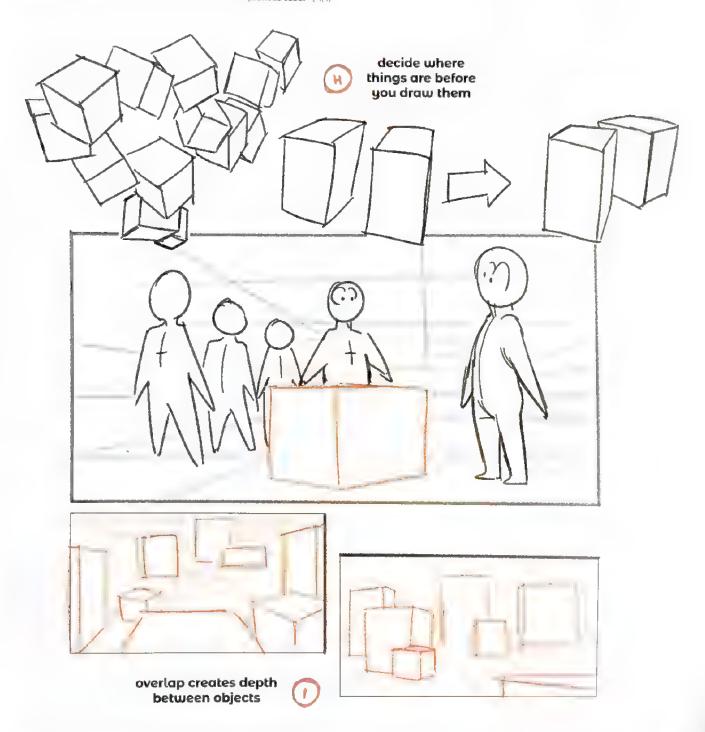


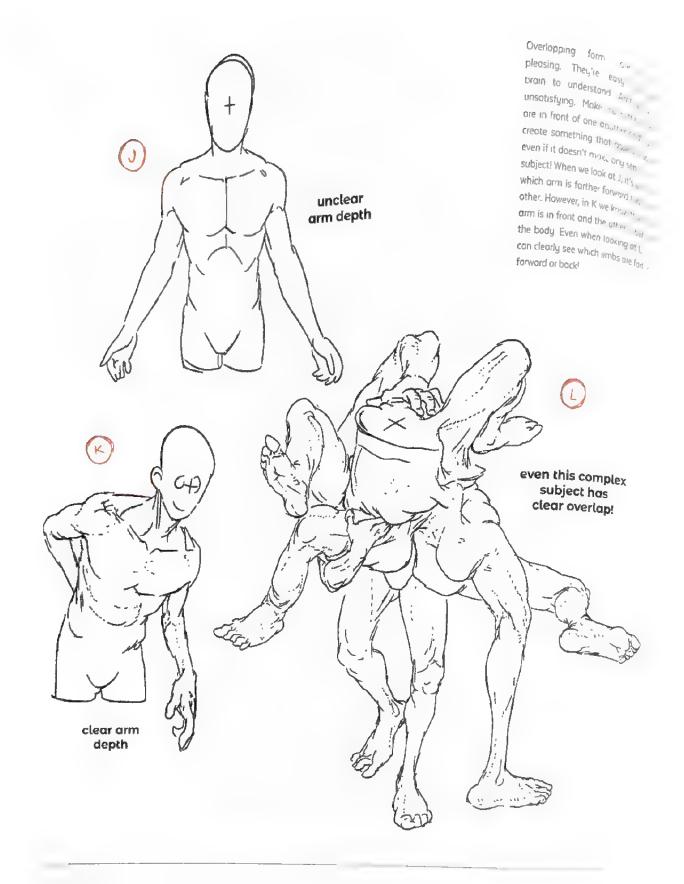
So we know we want to add overlap, but how do we do it? The answer: Make a choice. Every line you draw will begin either above or below the previous line above (C D) Choose before you draw it. end result start below same outline, different overlaps some overlap points to look out for



So, now we know to overlap our lines, let's think about overlapping elements. We need to think of not just each

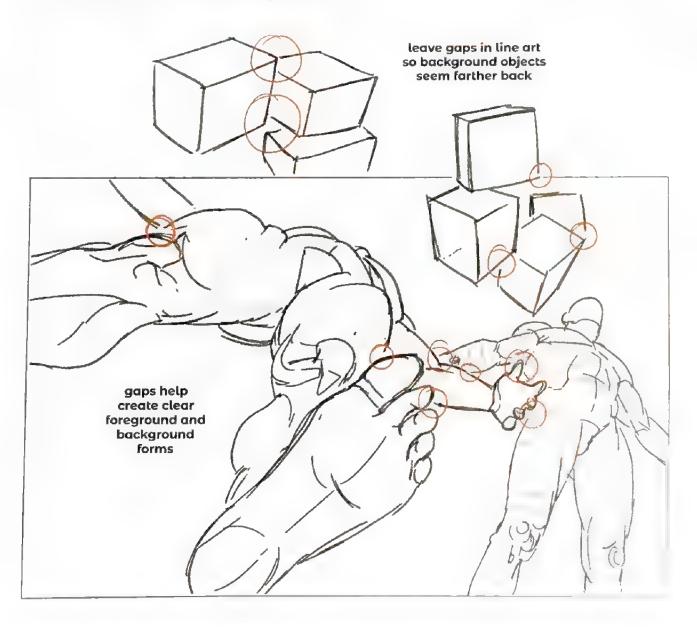
we're drawing. If we're drawing a pair of cubes, before we start the second one, we need to ask, "Is this behind or individual line, but the actual object — in front of the previous cube?" (H, I)



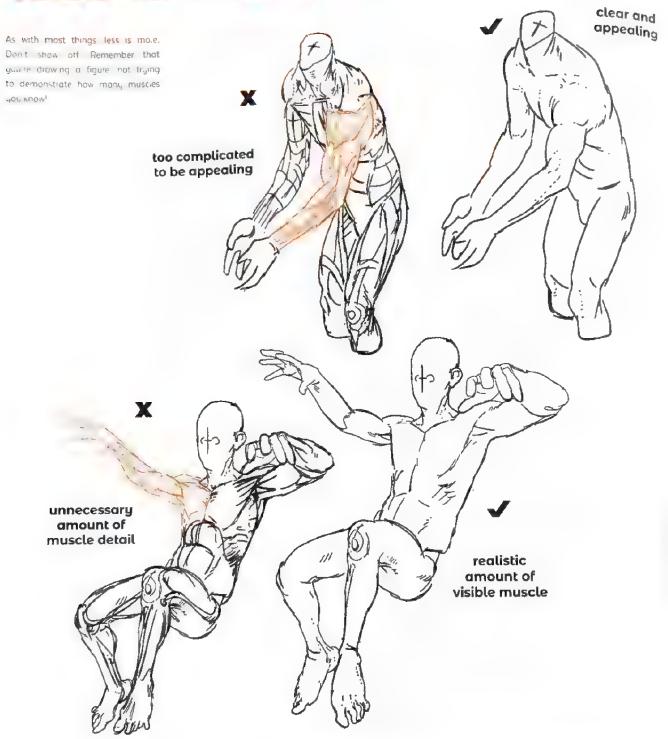


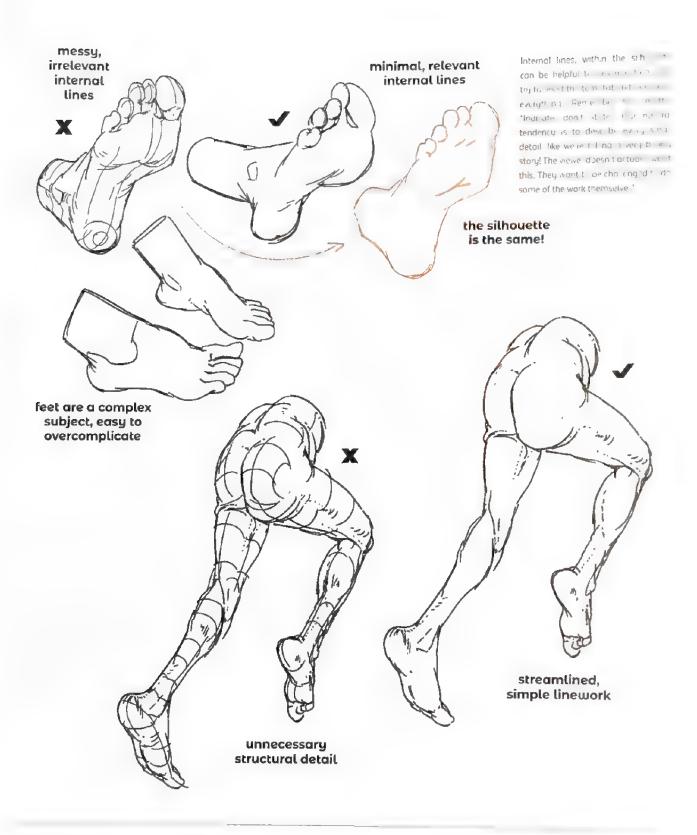
#### leave gaps

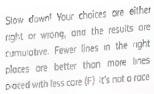
Let's say we're drawing several forms—the lines don't actually touch. When in front of each other As was sold—drawing the object that's forther back, earlier, this overlap will give us a more - try stopping the lines just short of the interesting image. One way to improve — nearer object, leaving a small gap. This this feeling of depth is to make sure makes the closer object stand out

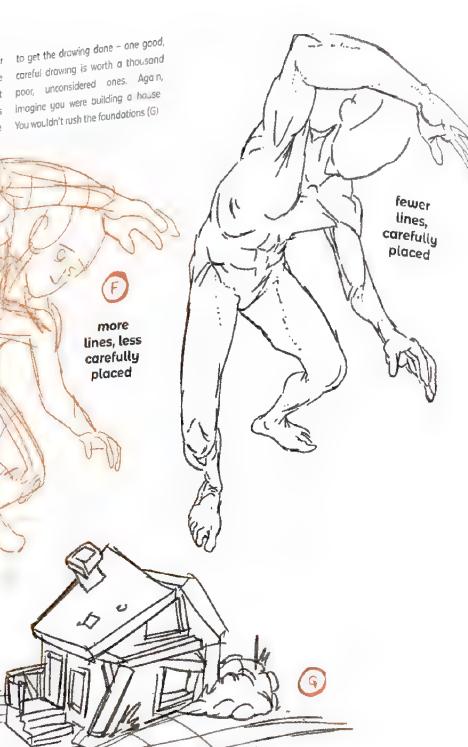


#### less is more







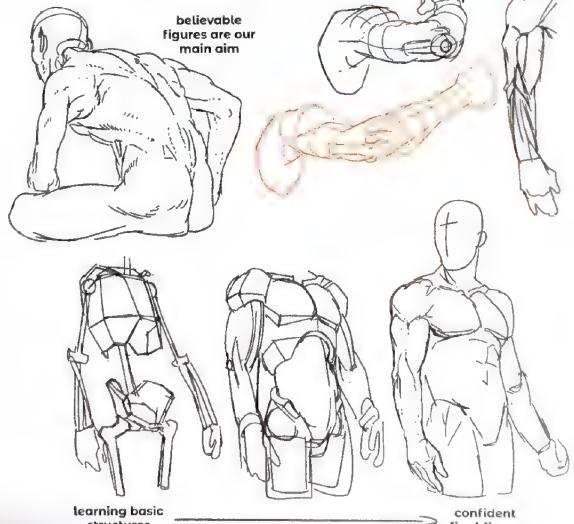


don't rush the foundations!

## accuracy isn't everything

we're not always striving for exact function mechanically.

Make this your mantra "Believable is realism. That would be improctical memorizing better than accurate." Even though and, worse, baring! We only need to every muscle is we're aiming to make "correct" choices, achieve something that appears to not our goal! believable figures are our main aim



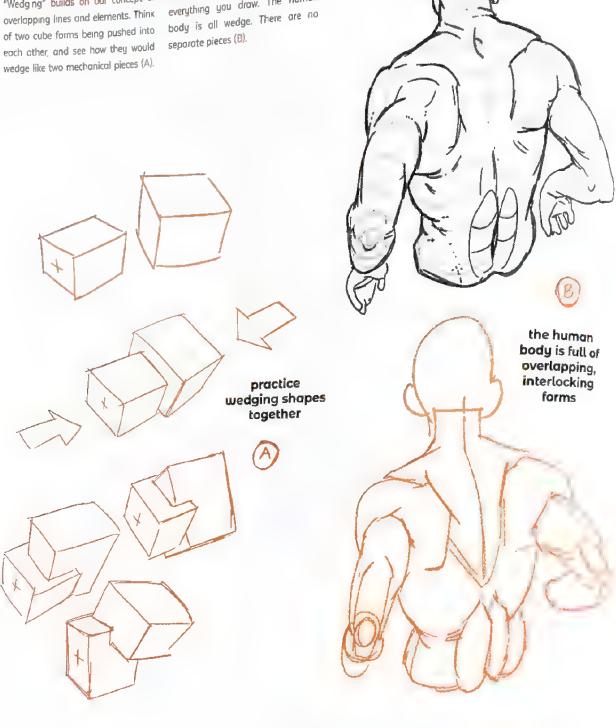
structures

final figure

#### wedging

"Wedging" builds on our concept of overlapping lines and elements. Think of two cube forms being pushed into each other, and see how they would

Aspire to show wedging in almost everything you draw. The human



We can wedge much more than simple cube forms. Throughout this book we'll be using wedging to combine complex forms as we approach a more realistic level of anotomy. Here, C, D, and E show some examples of the direction we'll go in later we'll explore how the arm works later wedging the muscles of the leg example mannequin arms

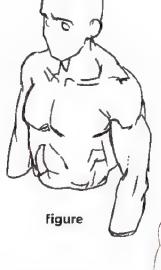
## silhouette, contour & proportion



Silhouette is a powerful tool in our imaginations fill in the blanks, giving drawing arsenal. A clear silhouette is—us something that's identifiable and instantly recognizable and "readable." appears to have an orientation in 3D If we add some overlap to the space. Our brains are amazing, contours, it becomes a 3D form. Our



overlap





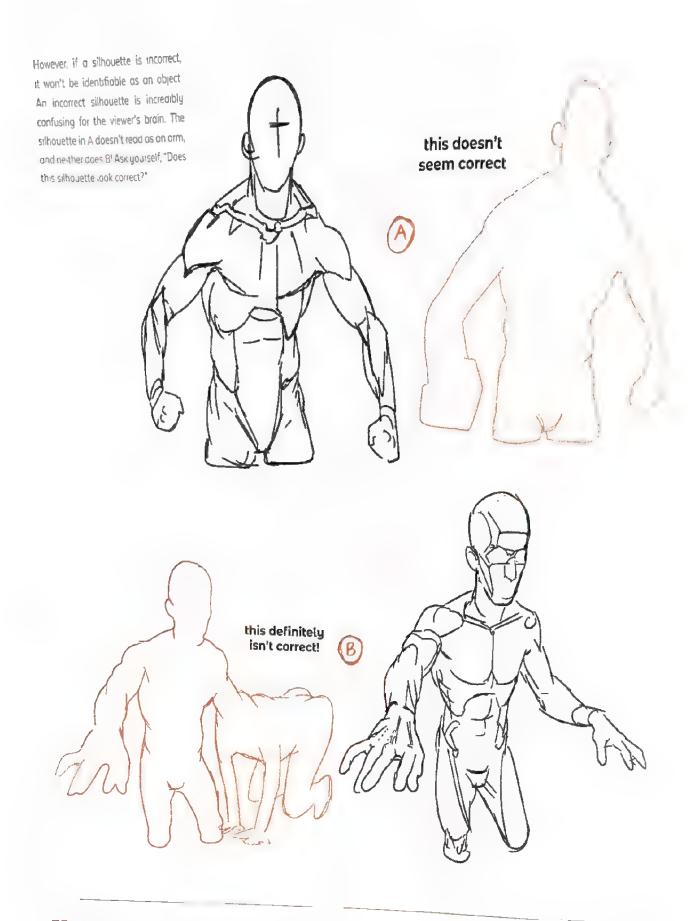
silhouette

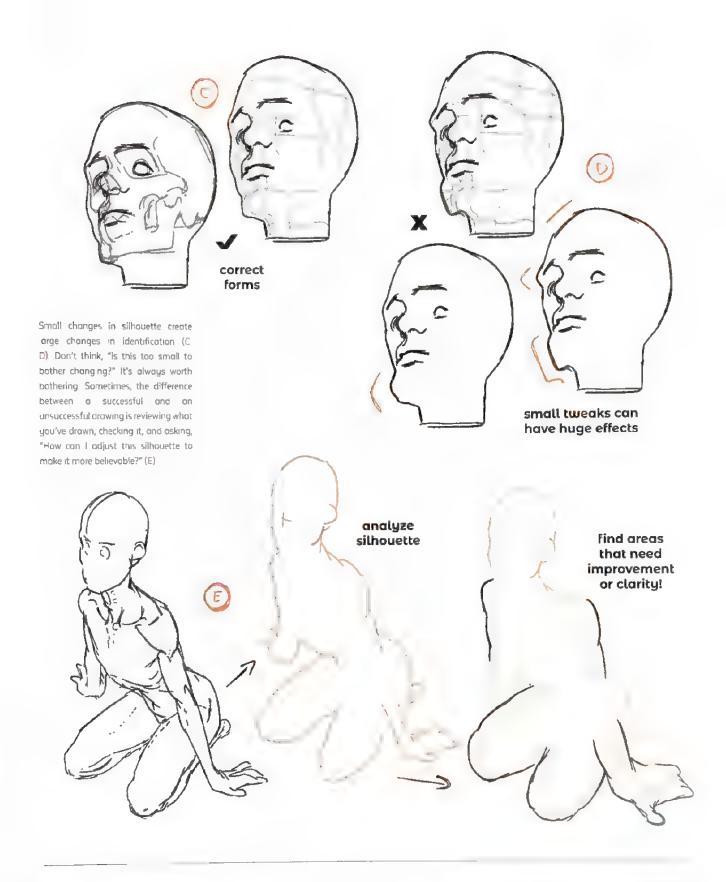


detailed muscle



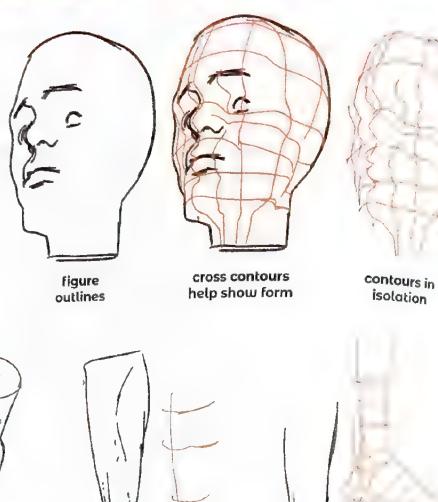
silhouette

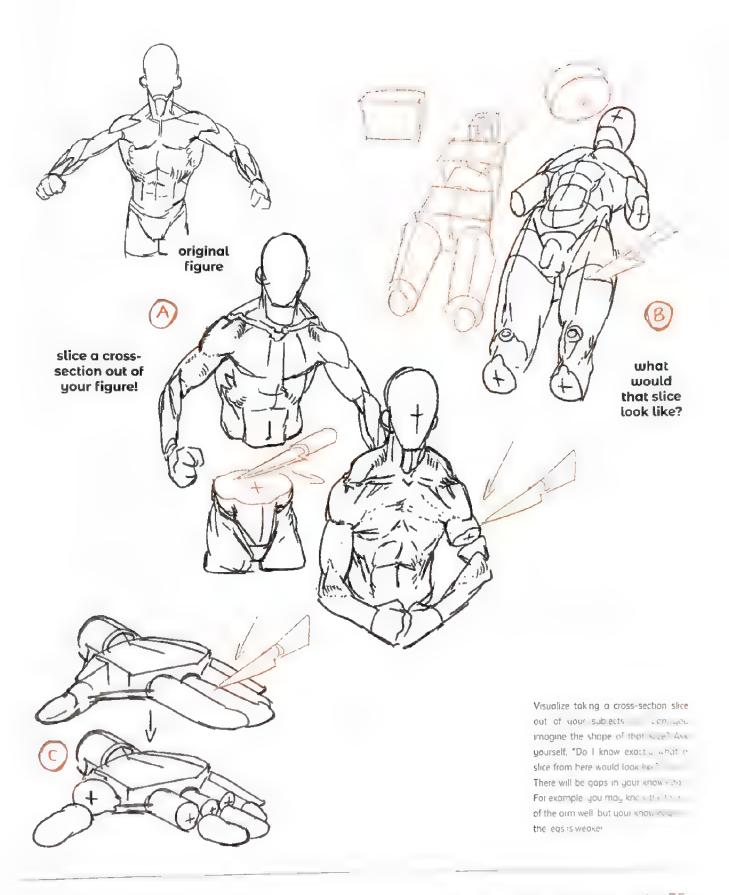




### contours & forms

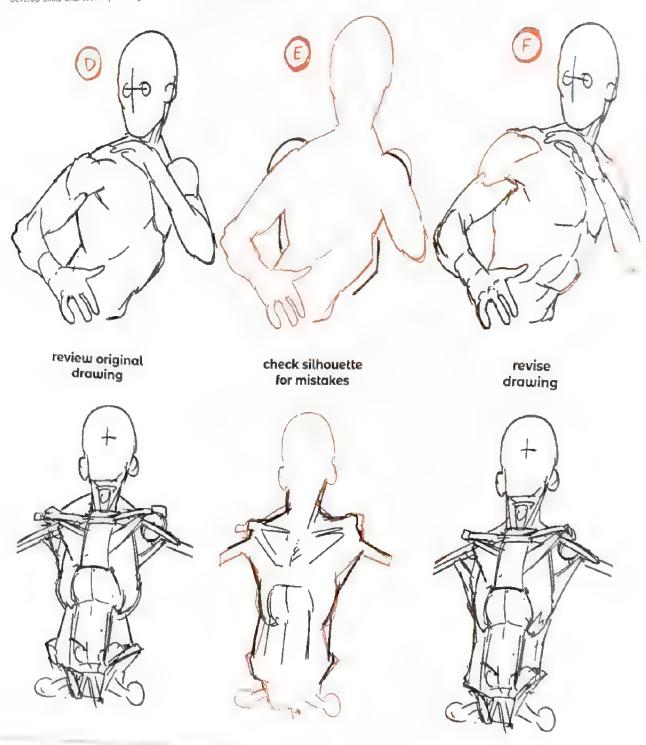
Contours are an essential tool for representing forms. People often talk about "cross contours" or "linear contours." They're all the same thing: lines across the subject that help describe form to the viewer. The question to ask yourself here is, "Can I draw the contours around this form?" If you can't, you don't know the form well enough yet

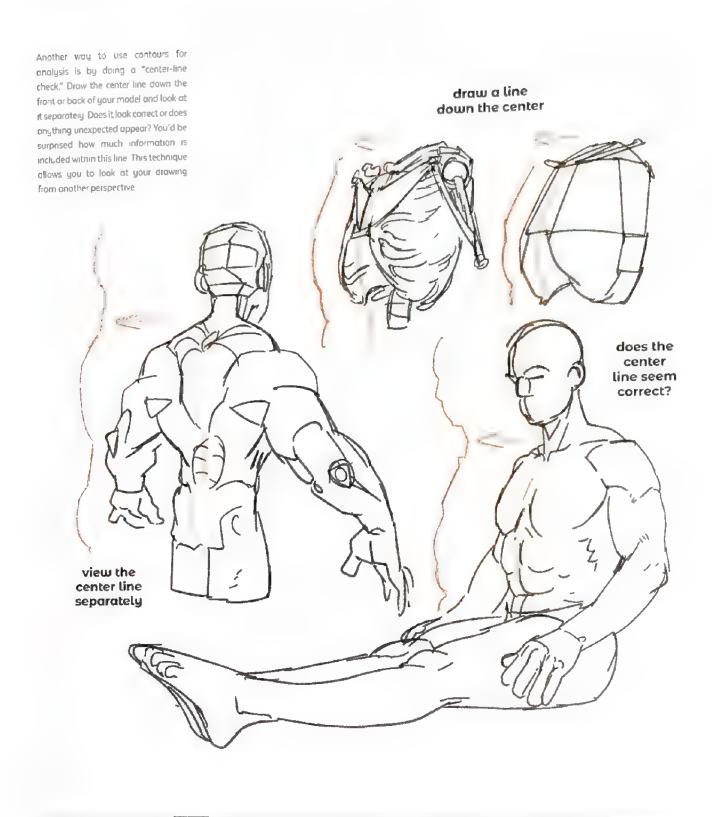




So how can we use our knowledge of silhouette in our drawing process? Remember that the goal isn't to learn esoteric information about art - it's to develop skills and techniques. A great

technique is to outline your figure's silhouette and look at it without internal lines (D, E). Any mistakes will be more obvious this way, and you can then adjust them accordingly (F)



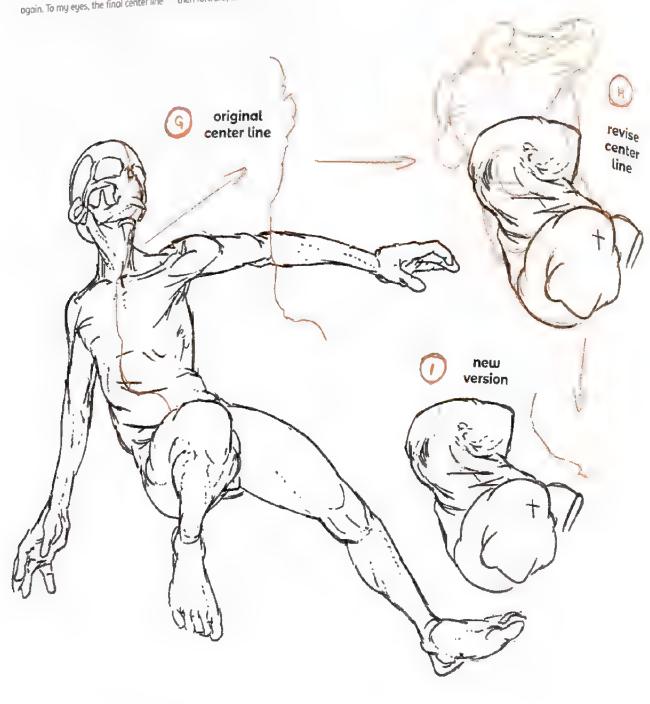


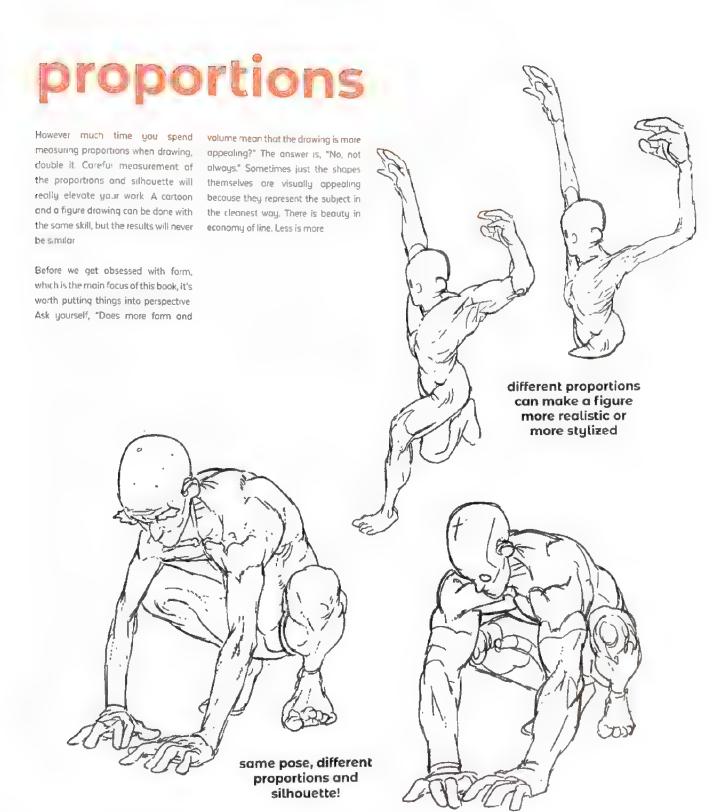
Here's an example of that process.

Here I checked the center line and decided I didn't like it because it was too ambiguous around the core (G), wanted a leaner look, so I redrew the figure's midsection (H) and checked again. To my eyes, the final center line

describes the twist much more clearly than before (I)

Are you seeing a pattern here? Figure drawing is a constant process of working forward, then looking back then forward, then back

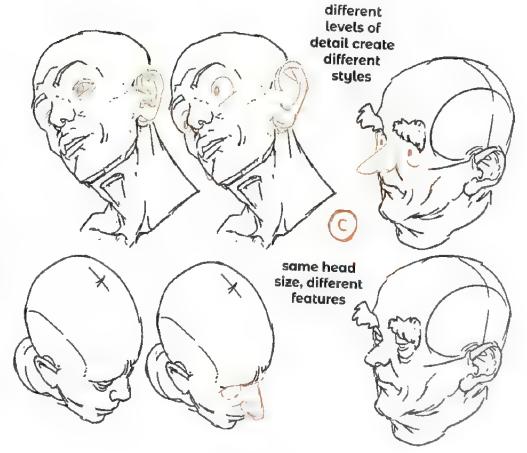






Subtle changes in proportion make a huge difference. Lengthening a nose by a mill meter doesn't seem like much, but that doesn't mean it's a small change. It's all about context. You've changed the relationship between the nose and the other features. The difference may only be a millimeter or two, but the effect is large (A) Similarly, reducing the size of features by a fraction may change the whole impression of a character (B)

By changing the size of features, level of detail, or both, you can change a head's proportions, and therefore its style. It's incredible to see the differences these changes make, even on a head of the same size (C)

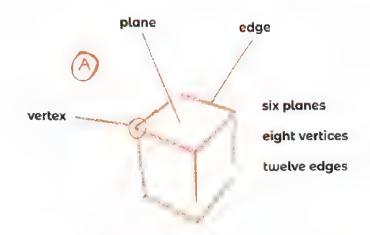


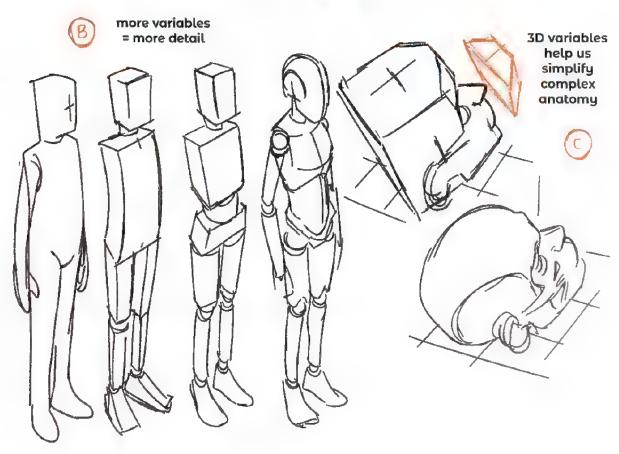
We can change not only the features' sizes and levels of detail, but the distances between them. This provides very different results, even when using the same features. A larger forehead or a higher nose are significant changes! different face placement different feature spacing different feature size

# level of detail

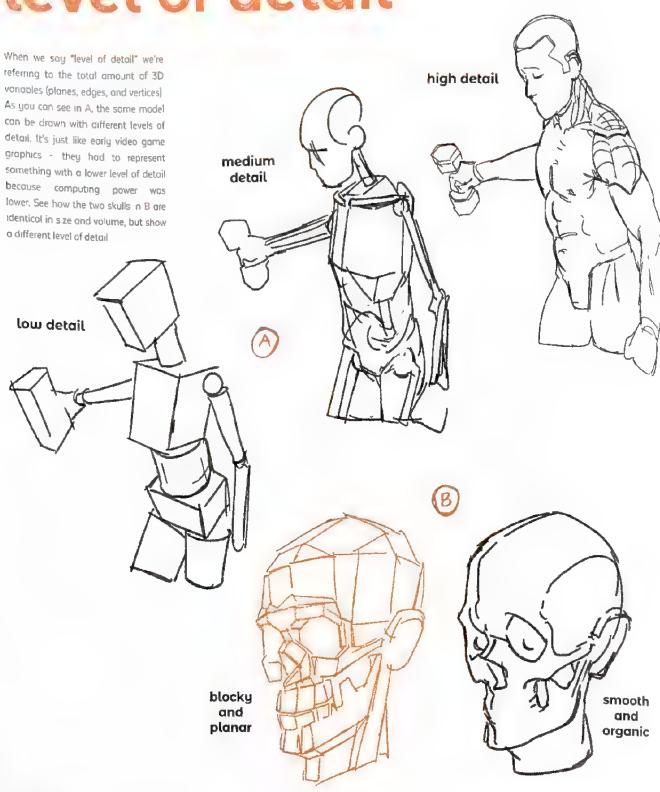
#### 3D variables

Every 3D object has three components vertices, edges, and planes. In A we see that vertices are the corners, planes are the "faces" or "sides," and the edges are the edges! The more of these variables our subject has, the more complex it is in terms of detail (B). A cube has six planes, eight vertices, and twelve edges, so it's more complex than you'd think. We can break down complex subjects into planes, edges, and vertices to help us study them (C)



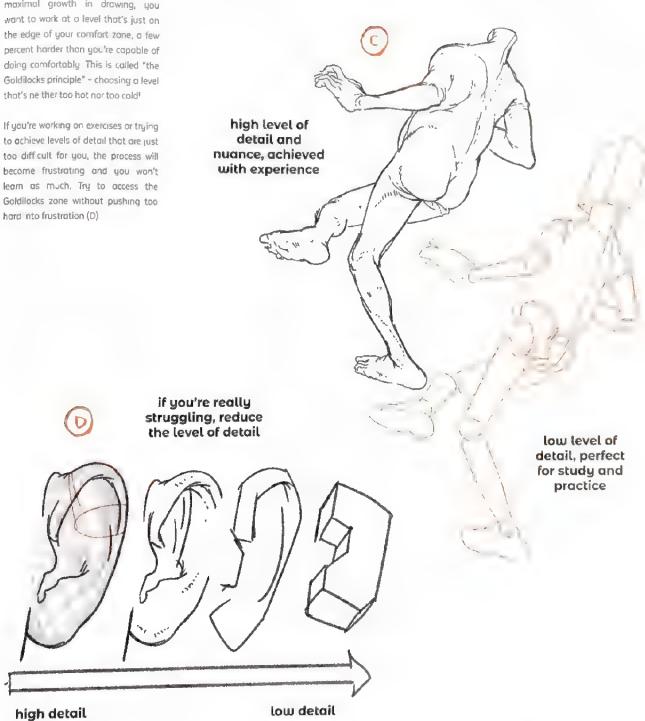


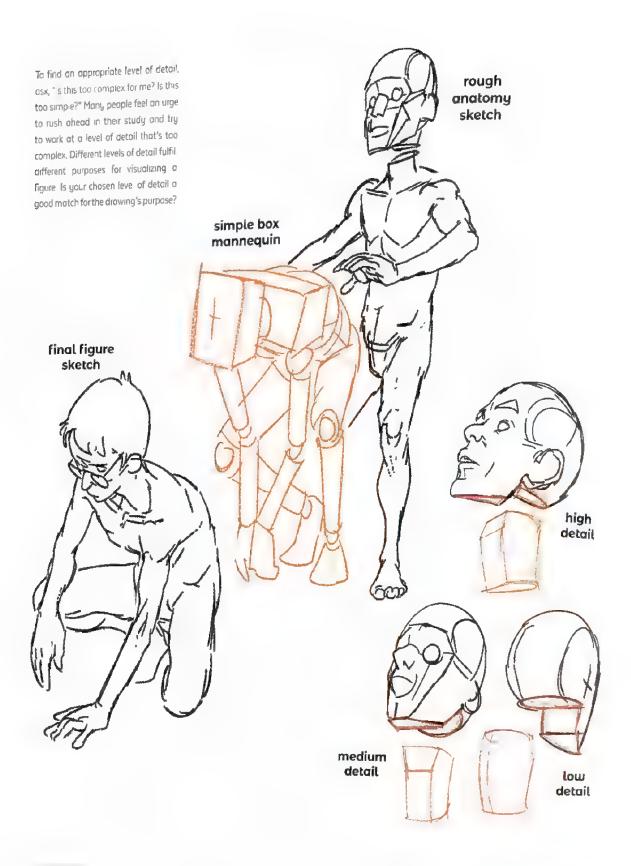
#### level of detail



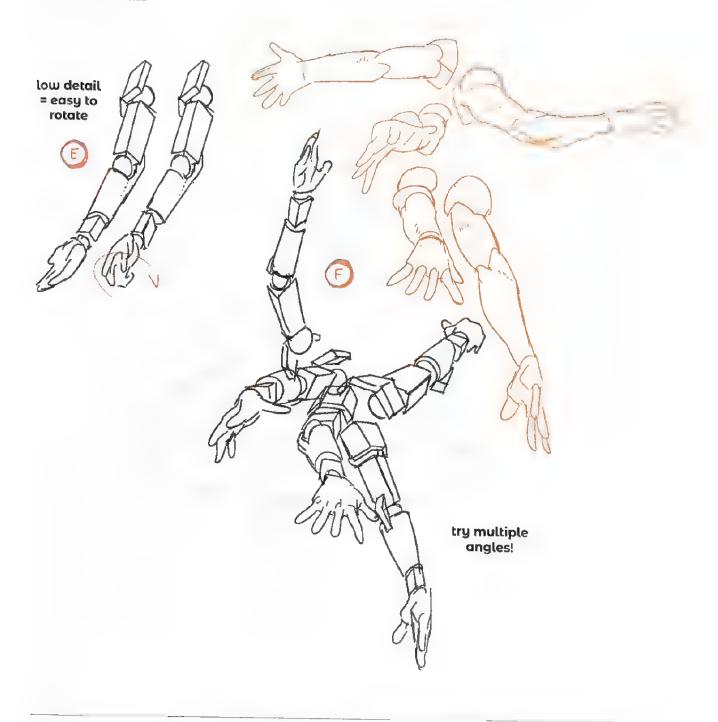
Always work at a level of detail that's appropriate for you (C) To achieve maximal growth in drawing, you want to work at a level that's just on the edge of your comfort zone, a few percent harder than you're capable of doing comfortably This is called "the Goldilocks principle" - choosing a level that's ne ther too hot nor too cold!

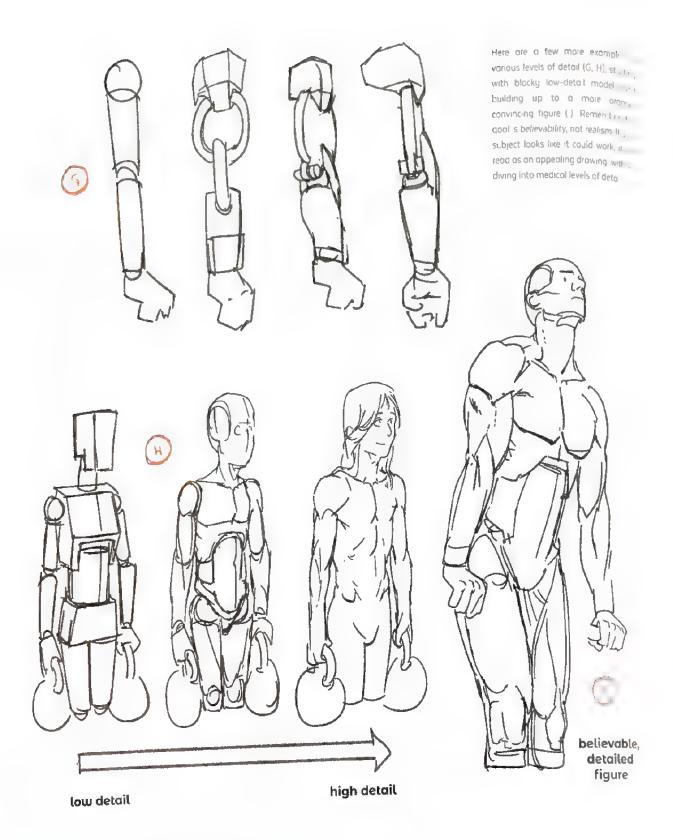
to achieve levels of detail that are just too difficult for you, the process will become frustrating and you won't learn as much. Try to access the Goldilocks zone without pushing too hard into frustration (D).





You should also ask yourself, "Can I rotate this and draw it from my mind at any angle?" (E, F) Put yourself to the test, and if you're not sure - which you probably won't be - try opting for simpler shapes and less detail!

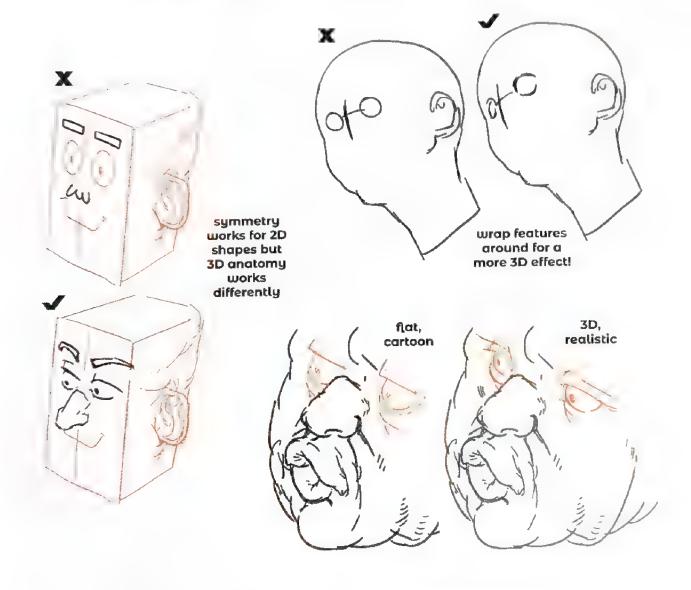




#### flat vs 3D forms

then the service of a more depart from cartooning, you need to 2D shapes, symmetrical objects don't The state of the s \*\* USING DOSK symmetrical shapes of 3D form. Ask yourself, "Are these to ecrossors rectures, like using flat shapes symmetrical? Was that a cretes for eyes. However, once you choice or just a habit?" Unless they are

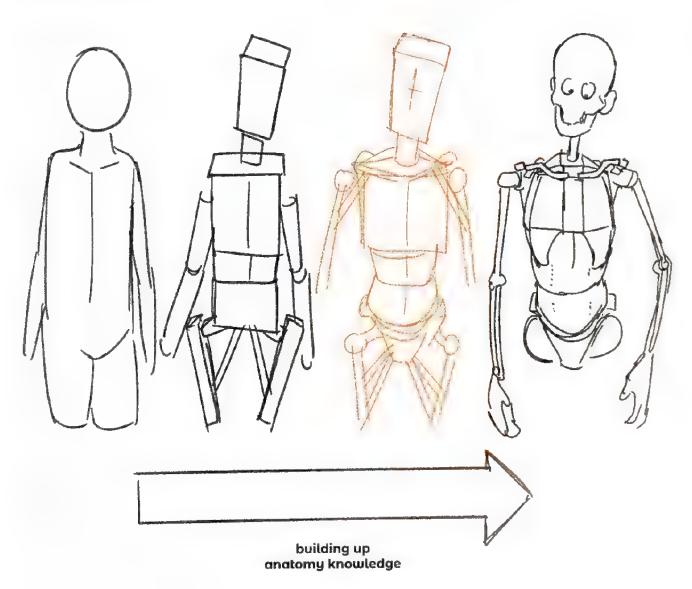
d fferent angles



#### don't show off

Strive to draw representationally and faithfully to your vision, In other words, draw what you see, not what avoid the temptation you know! The latter is just showing off to show off! your knowledge. Don't draw individual muscle fibers and striations. Focus on the si-houette and the major forms, and the rest will take care of itself focus on the "big picture"

The sections of this book will be focused on leading you, region by region, through how to design models with increasing levels of detail for the anatomy of the body. We'll start with a cube form for each region and end up with something approaching a realistic human body. Along the way, you'll find a level of detail that works best for you and your art

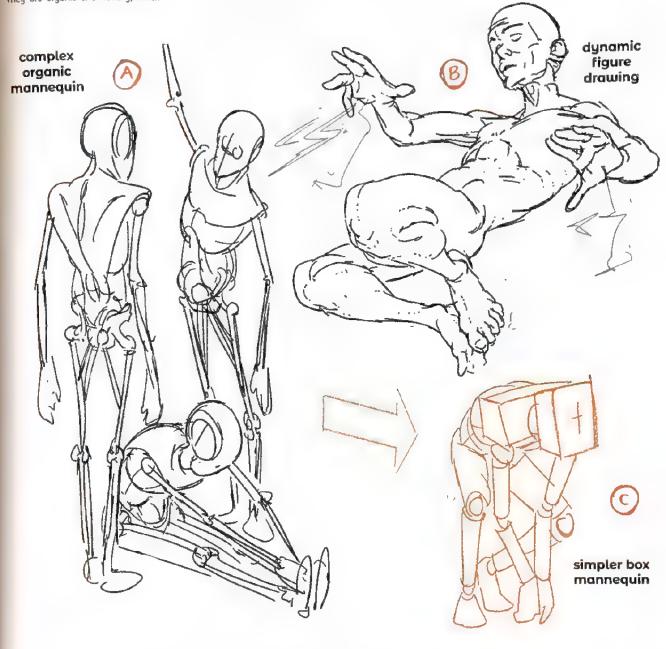


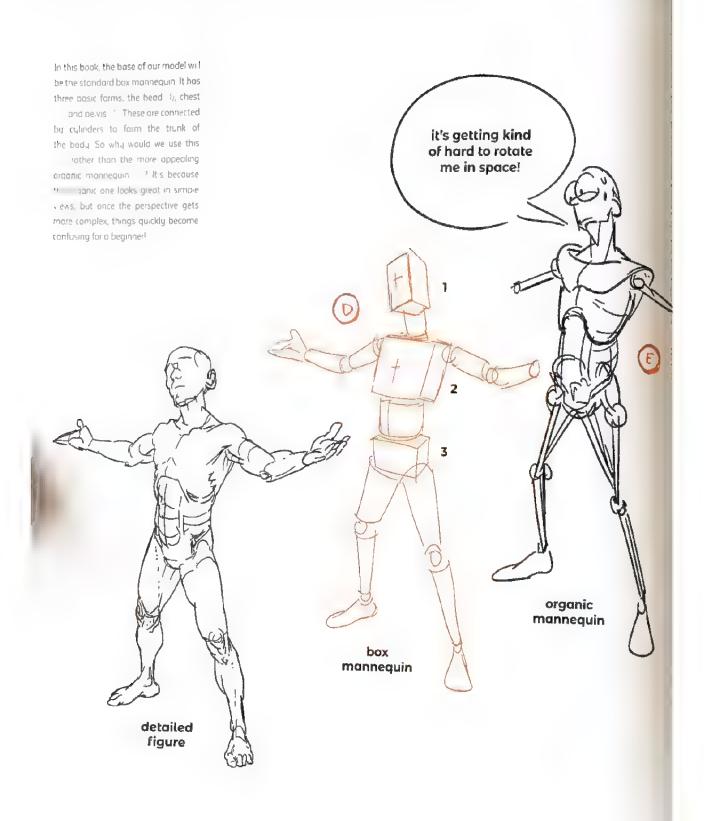
## the box manhequin

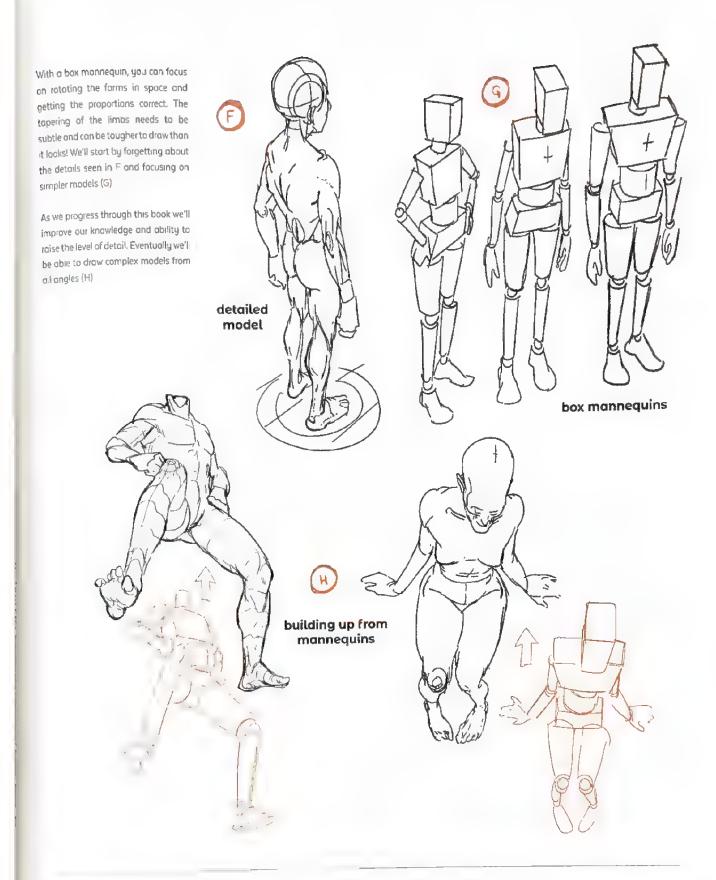
#### mannequins

We often begin learning anatomy gives them appeal. They also seem to by using monnequins as simplified representations of the figure (A) Why? For starters, they look good! They are organic and flowing, which

make intuitive sense; if our gool is to draw something organic and dynamic (B), shouldn't we start with an equally organic mannequin? Let's examine why using a hard-surface model, like a box mannequin, makes more sense







# the camera & enspective

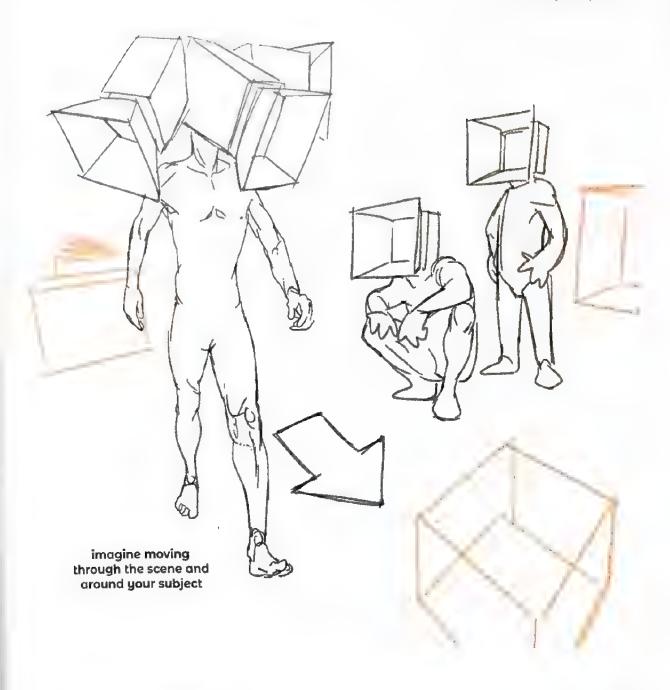
#### perspective

When learning about perspective many students warry about knowing where the vanishing points are, what type of perspective they are using, and what to measure angles from



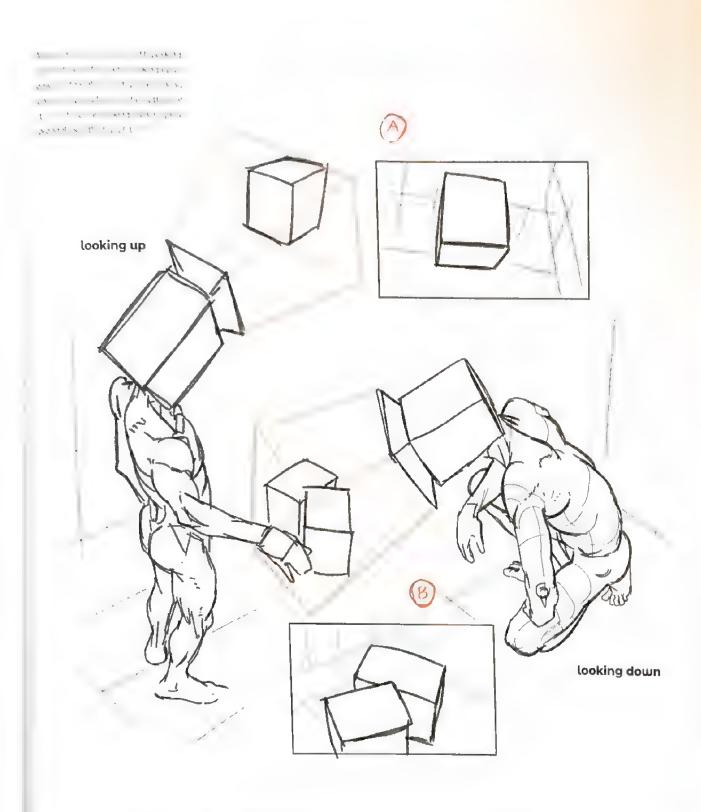
In depth explanations of perspective are outside the scope of this anatomy book but we can keep things simple for now and explain how to think about your view of your subject. For starters. imagine your head is a camera imagine your own head is a camero what ca in your range c

Whatever you're drawing, try to imagine the subject existing within a scene, so it has context Imagine yourself waking through the scene and looking around with your comerahead observing the subject

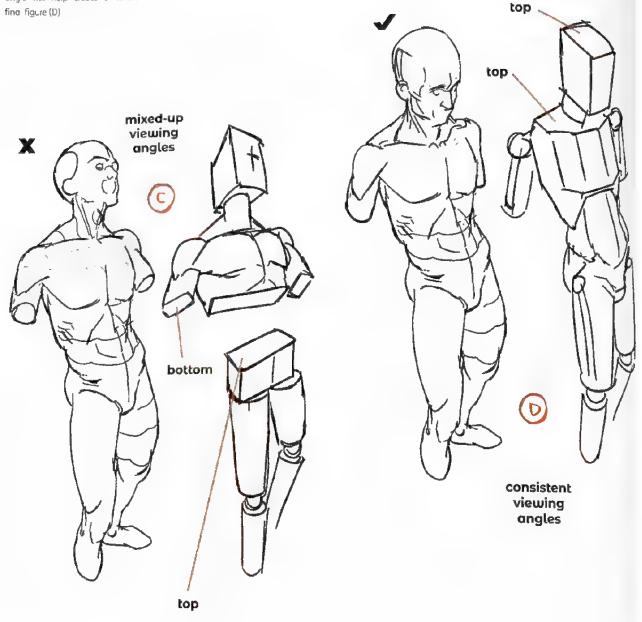




scene, not just what you're looking at "through the camera." This helps clarify the scene in your mind and give it context. Overlap creates depth within a scene, just as it does within objects, so don't forget to overlap elements.



Decide the angle before you draw the subject. If you don't, you'll encounter inconsistencies at a ater stage, where it looks like you see the tops of some parts and the bottoms of others (C). Planning ahead and sticking to an angle will help create a consistent fina figure (D).



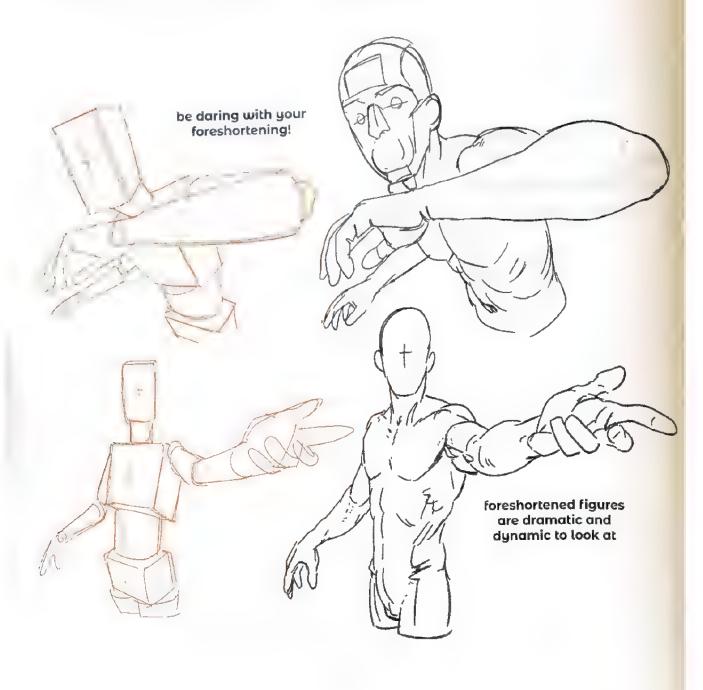
## foreshortening

We create depth and perspective with foreshortening. This is the illusion of an object being rotated toward the viewer, changing the relative XYZ measurements, often giving the impression of being larger and claser to the "camera." Foreshortening is generally quite hard, but the reward is that your figure looks more dynamic and interesting to the viewer, Foreshortening hides some parts of the subject, I ke the upper arm in A and the lower body in B, but as we've learned, the viewer wants to do some work and figure things out, like a puzzle foreshortened parts appear closer to the viewer overlaps help create foreshortening

Dare to foreshorten. Push the foreshortening more than you'd normally feel comfortable with Try to draw things from angles you don't often see Sometimes I hear, "What

don't know the ratio of head heights to length of orms!" I don't believe in measuring your work like that, for var ous reasons - the main one being measurements for now!

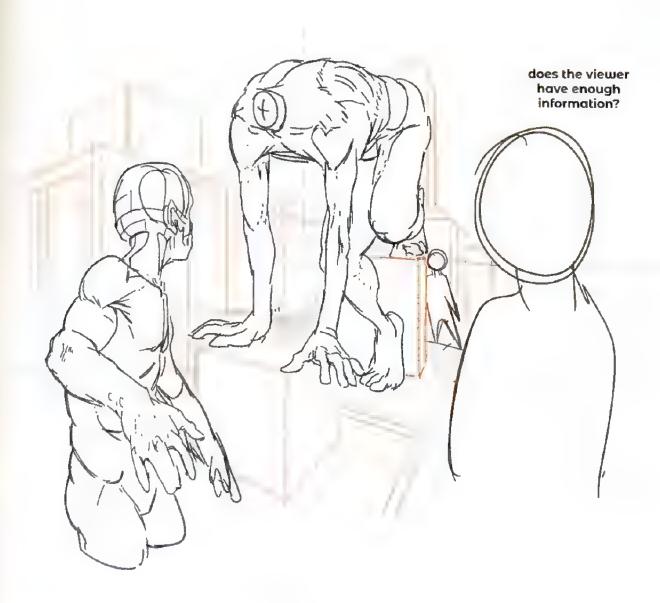
about taking measurements?" or "I that your figure is constantly subject to change, depending on its distance from the comero and the comero's "lens" type. So don't worry about



## rovide context

Drowthings in context. When the viewer working, go through the elements of looks at your image, they should know instantly which objects are in front of front of that? Which is bigger - this which, and which ones are bigger or

the image, asking yourself, "Is this in or that?" If you can't answer those smaller. To check if your drawing is questions, neither will the viewer!



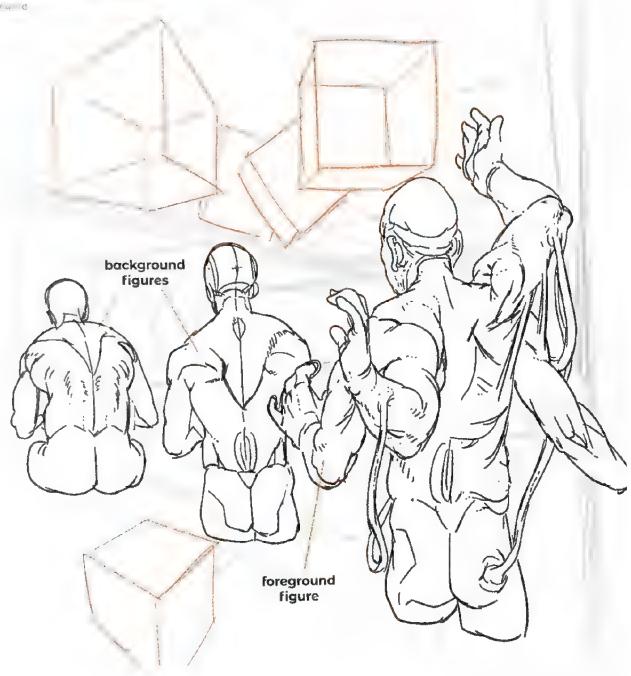
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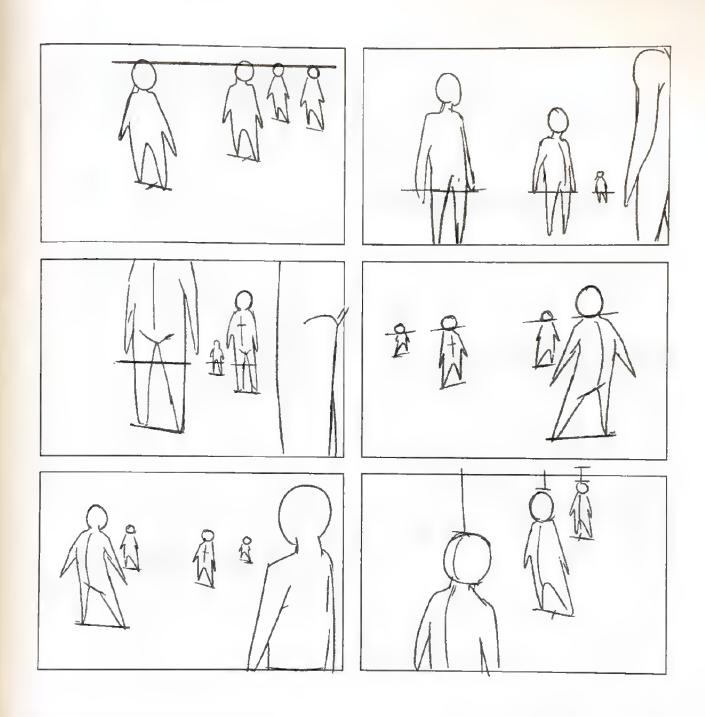
Frot t = e sourmove on to drawing

the ger' rement. This will help the

Frote in introstand and navigote



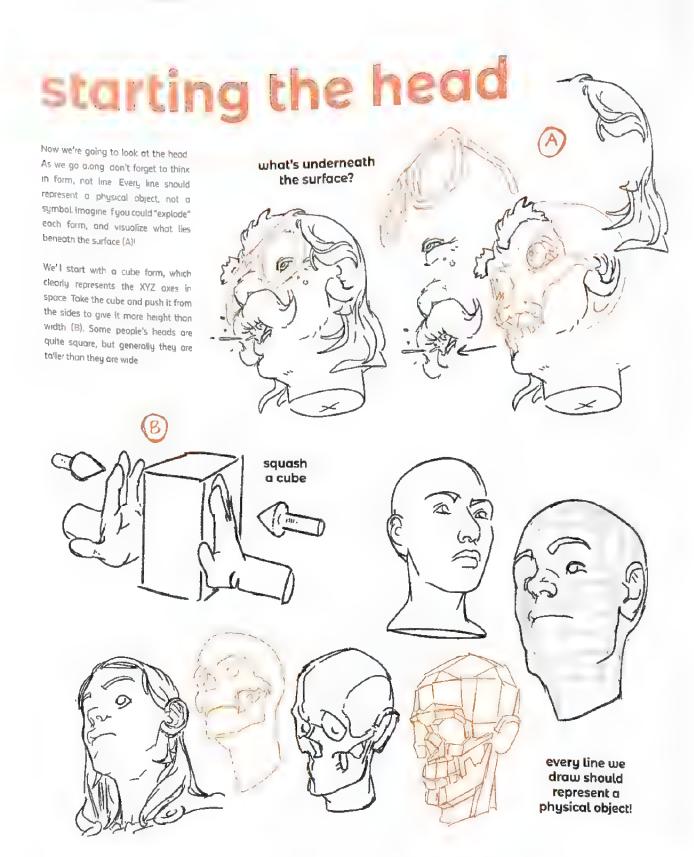
Here is one final perspective tip I can are all similar heights, the horizon line share: Objects of the same height will will cross through their bodies at the cross the horizon line at the same point—some places. This is powerful because on the body of the people in your scene at allows you to show context!

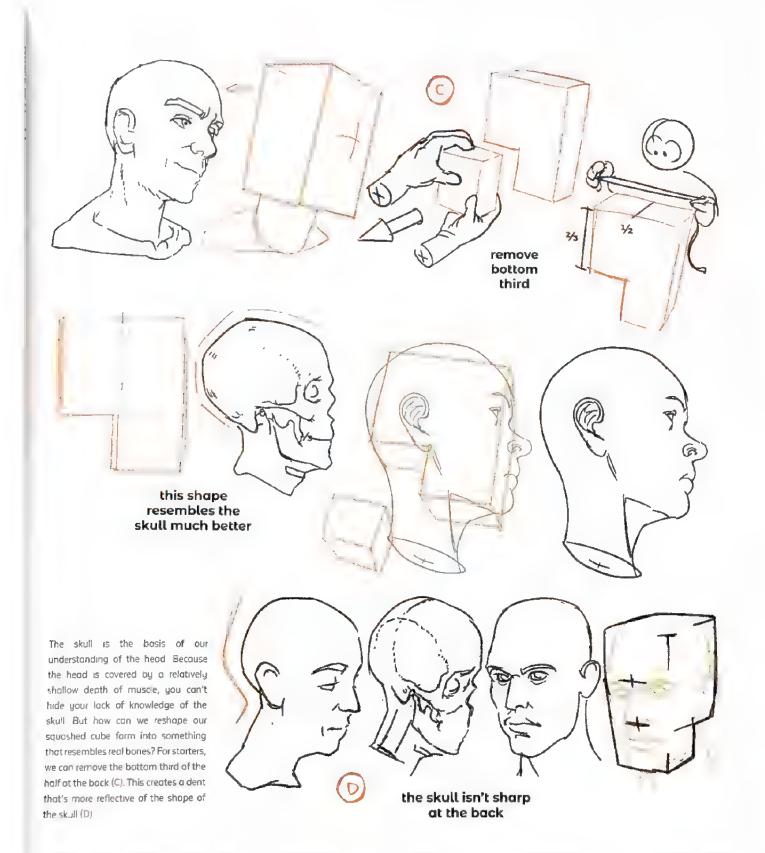




#### lesson 1:

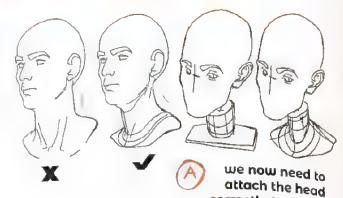
Let's start our anatomy journey from the top: the head! We'll cover the forms of the skull, the bones and tissues of the face, and the importance of proportion for creating varied faces.



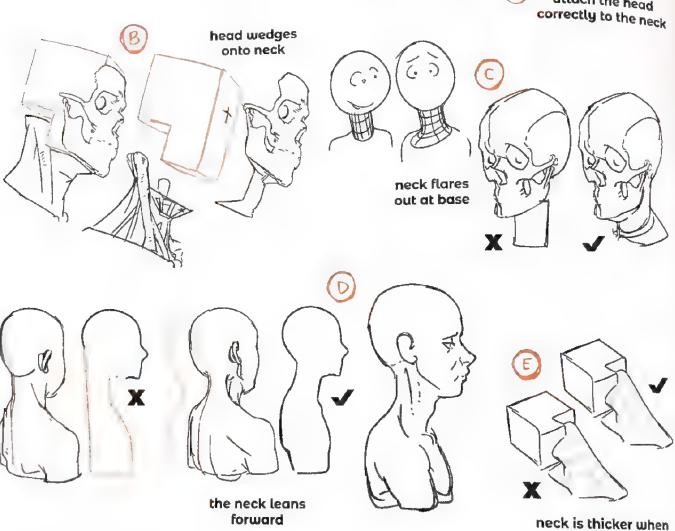


Removing the lower rear third of the block establishes a clear relationship between the head and neck. This is on important attachment region. Without that section removed, the head would look like it's sat on the end of a stick back of the head and the face sits on — the shoulders (E) top of this "P" shape (B)

The neck isn't a stick. It's more tubular and flares out at the base (C). The back of the neck isn't vertical but instead eans forward (D). The volume of the neck increases when the head leans to one side, as the muscles are pulled (A). Instead, the neck wedges into the <u>tight, like a rope, between the skul</u> and



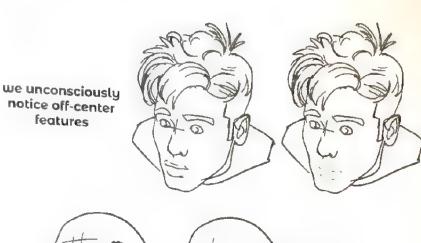
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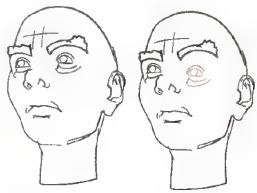


## tip: how versus where

Performance of the control of the co

Drawing something with a different number of create list i style change but drawn is nething in a different place is the difference between it reading as correct or not. A to B is just a different style – a change in how the subject is drawn B to C is a change of where things are and it ruins the drawing. In C, we see how moving a feature throws off symmetry.





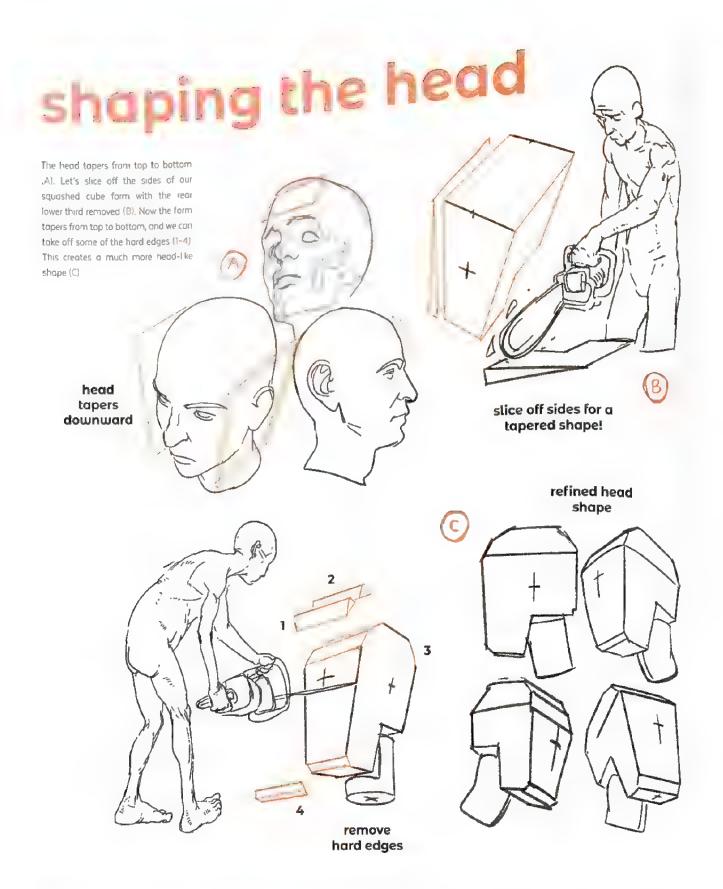
same features, different placement



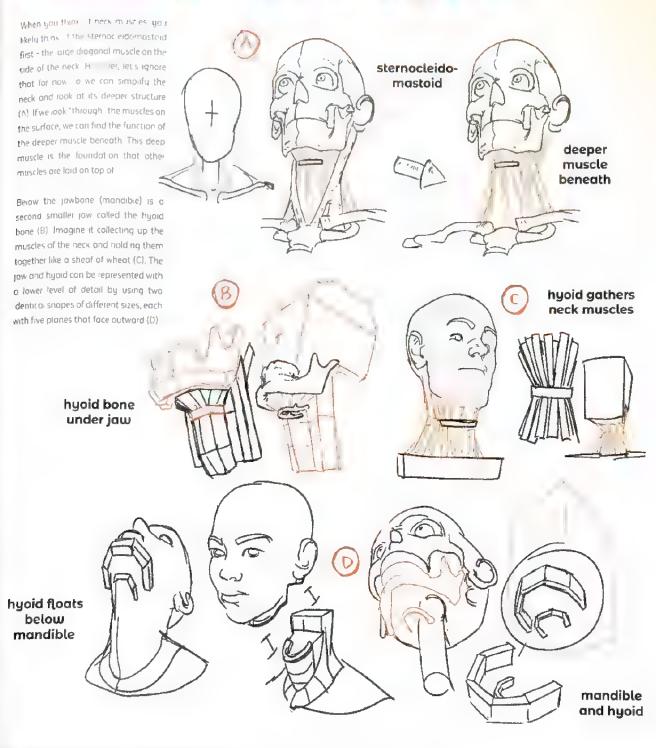


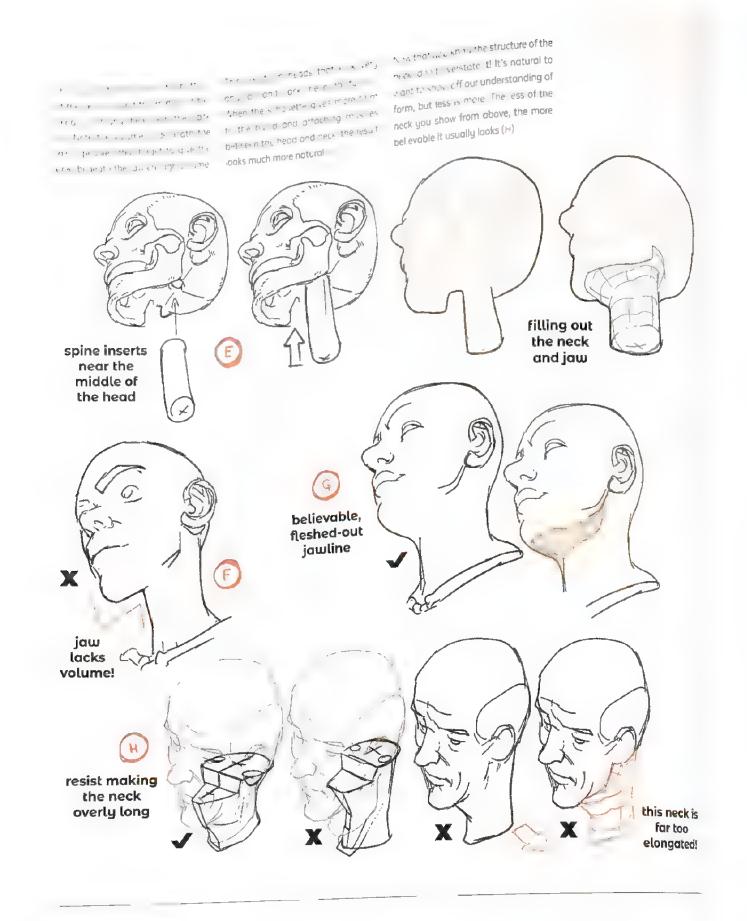


placement breaks symmetry



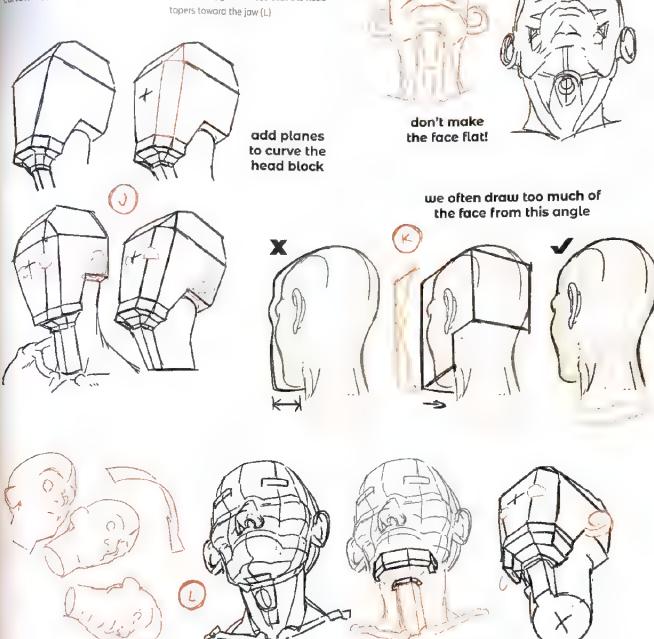
# joining neck & jaw





To drow the note that the face wrops around the head and sn't flat (!) Using the same model, let's add two extra planes to each side of the face to create some curvature (J).

When drawing faces from behind, we usually draw too much distance between the neck and edges of the face. This is because we underestimate how rounded the face is (K). Even from below, you can see that the head tapers toward the jaw (L).



from every angle, the head tapers toward the jaw

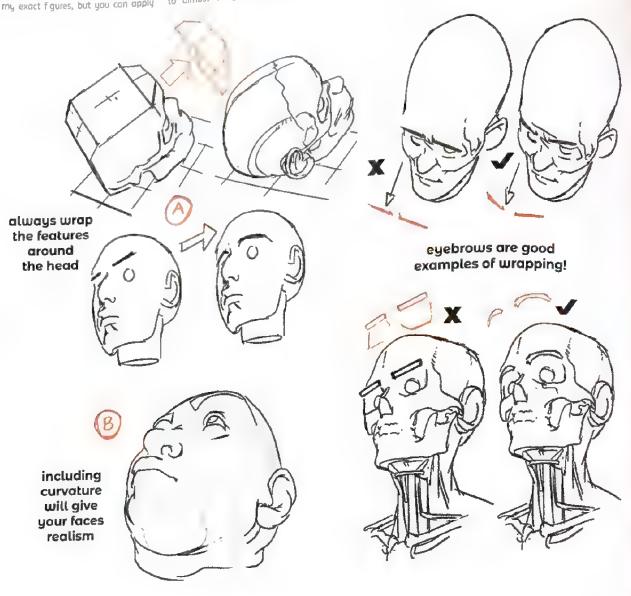
# tip: useful tricks for heads & faces

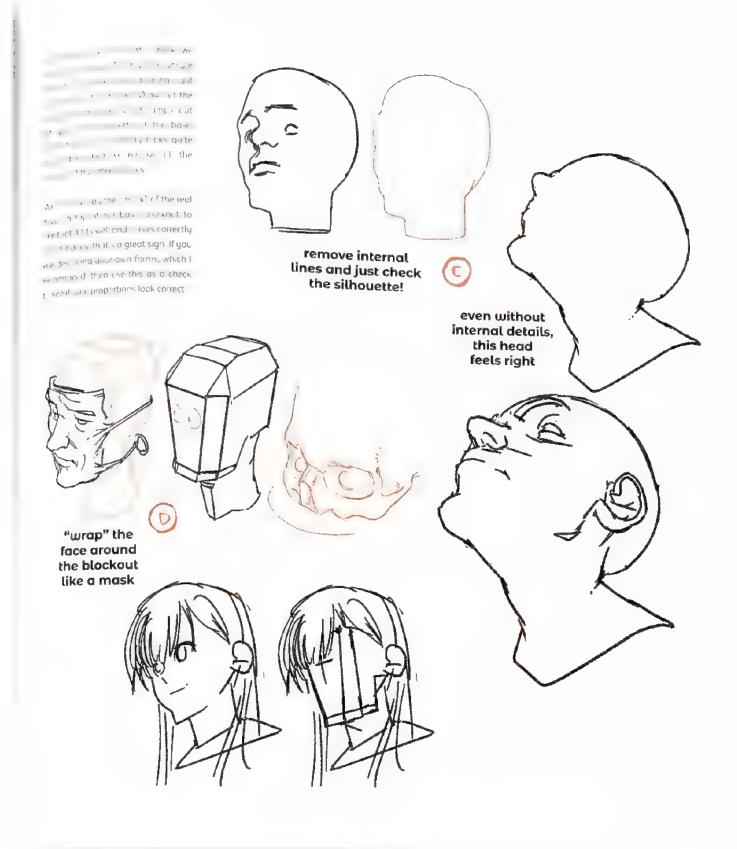
When we draw the head, we con start with defined blacks and chise away like a sculptor. You don't need to follow my exact figures, but you can apply

the same principles yourself. Here are a few more anglet and example heads for you. Observe how curvature extends to almost every part of the face,

wrapping it around the form of the head (A). If you're looking at some of these and thinking, "That's only subtle - I don't need to worry about including

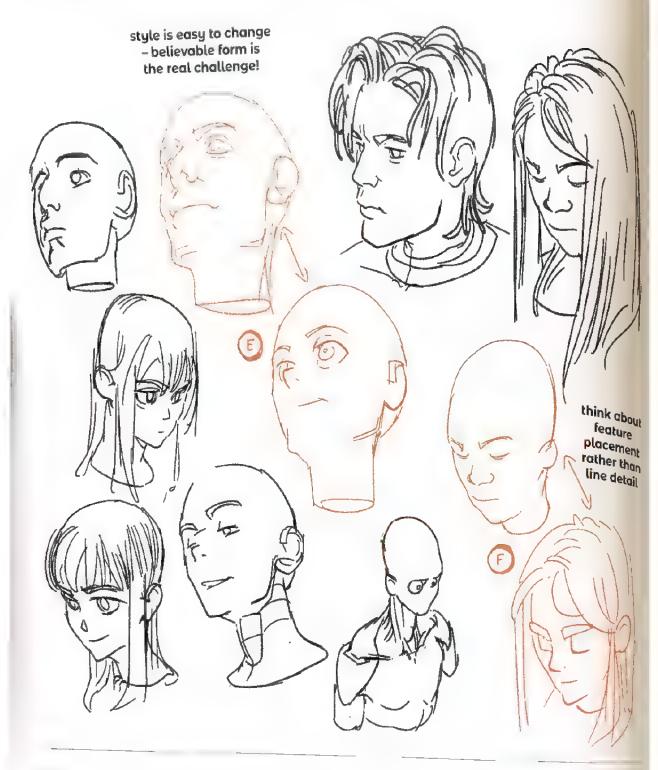
that!" that's where the realism lies, if you are cartooning, that's fine but 'c draw something approaching real life you have to learn the subtleties (g.





Don't worry about the style or quantity of lines you draw your heads with As we've seen, "style" is mostly just about how many lines you use, not about where they are located! Get the where

correct and you can adjust the style ater The E and F comparisons here all work as drawings with form and believability, even though the styles are different

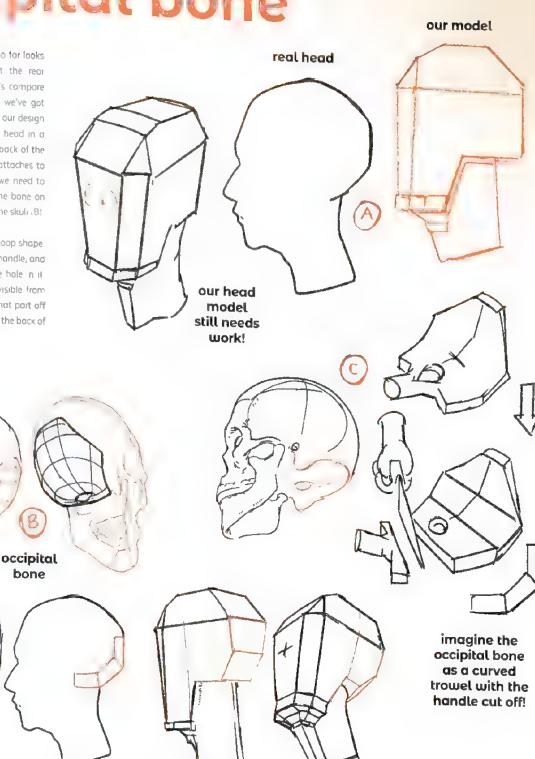


# cipital bone

The head · lesigned so for looks good from the front, but the reor section is still lacking. Let's compare a real profile with the one we've got so for (A) You can see that our design looks different from a real head in a few areas parkuarly the back of the head and where the neck attaches to the skull. This is because we need to odd the occipital bone - the bone on the bottom of the back of the skuli (8)

The occipital bone has a scoop shape almost like a trowe with a handle, and the spine runs through the hole in it The "handle" shape isn't visible from the exterior, so let's chop that part off and fit the occipital bone to the back of our design's head (C)

bone



Look at D to compare the "before and after" of aading the occipital bone. The outine has barely changed when newed from this angle, but the level of realism has hugely improved! We

We have now converted the skull shape into something planar, which is

your skirls at using the XYZ axes. Two important points are around twothirds back from the front of the head, and around two-thirds up from bottom of the head. These are the widest are looking for the subtlest of form and highest points of the skull (E-F) Notice how the skull tapers from top to changes to improve how we capture bottom, as we learned on page 79 the human body, so don't skip small adjustments like these without D occipital bone a chailenge to draw and will sharpen with occipital bone highest point of the skull 1/2 3/3 widest point of the skull

#### "known variables"

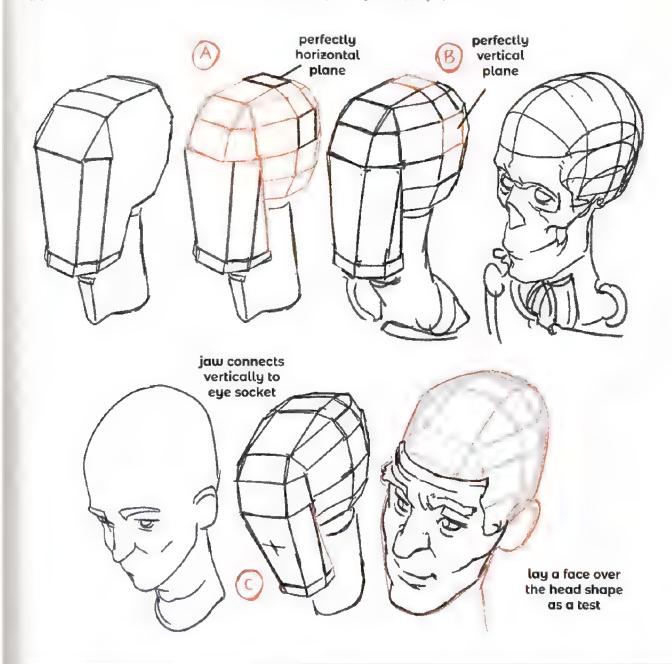
The head is curved on top, increosing in height up to around two-thirds of the way back. The sides of the head have a roundness, too. We can locate one key plane on top of the head that is perfectly horizontal (A) and one

plane on either side that is perfectly vertical (B) These are essential as we can use them as starting points to measure the other angles of the head inckname them the "known variables" because I know for a fact that they are

reliably horizontal and vertical across any kind of figure

The corner of the jaw rises almost vertically to meet the edge of the eye socket (C) Again, we can test our

model by laying a face onto the head shape, asking ourselves, "Does that silhouette look believable? Is that what I'd expect to see?" This one holds up we I to the test

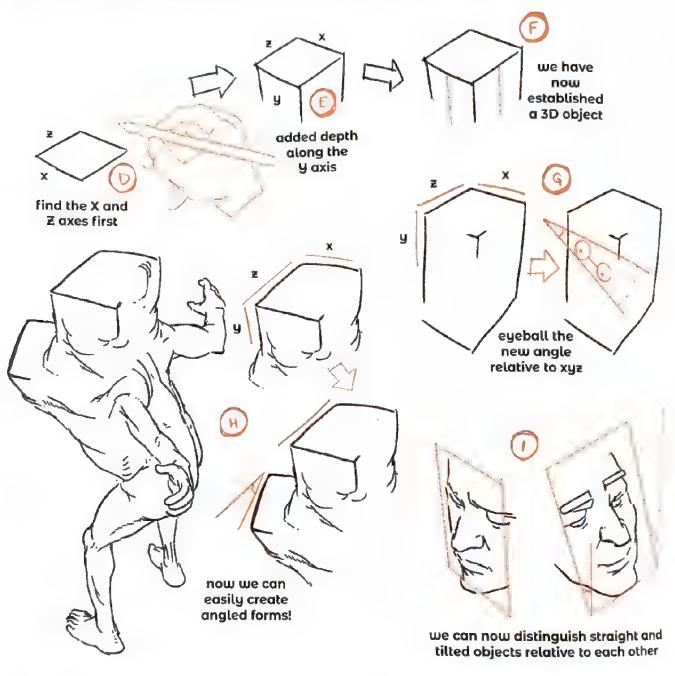


These "known variables" can also be appied to building up a whole figure or scene. At the start of a drawing, your perspective is undefined. You can choose the angle you want to see something from, and at what angle it's rotated. We can then choose to "pin" the perspective to certain lines that tell

us what the perspective is for the whole object. If we start by drawing a shape like D, we can pin our perspective to that, and use it to find our X and Z axes. By the time we get to stage E, we have used other lines to establish the top of the Y axis. Now we have pinned our perspective to a few key

lines. These are our known variables. We know these lines match up to the vertical, horizontal, and depth lines on this object (F)

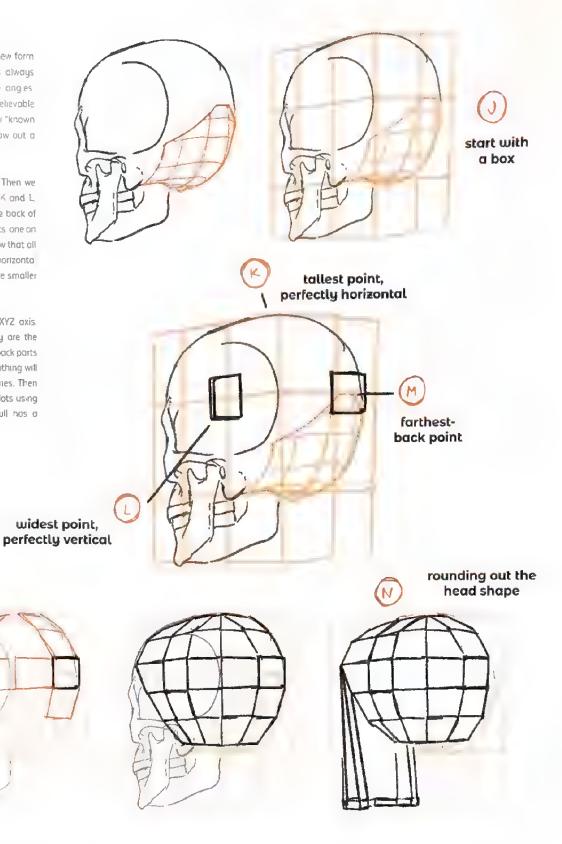
For example, I begin drawing the top section of a form and establishing my known variables of XYZ (G). If I want the next form to be tilted, I use my known variables as reference points for my measurements (H). If I know those I nes are vertical, then we can easily compare the other faces. Are they oriented vertically, or tilted? (I)

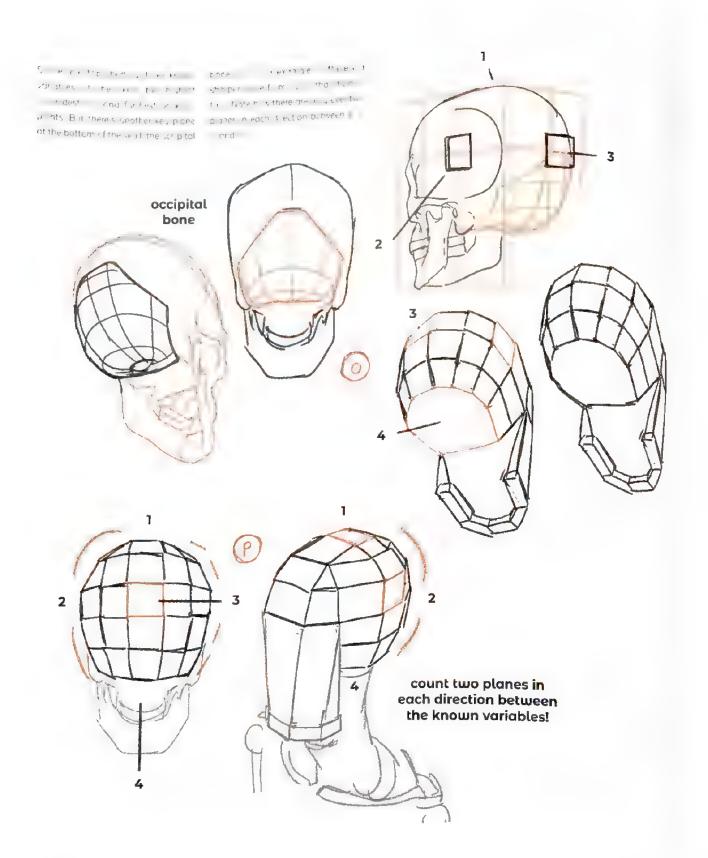


Are this, the hardest part is always memorizing it from multiple angles Algoridate and a rection. Using our "known variables" technique, let's draw out a planar subject in stages.

First, we establish a box (J) Then we measure out the key points K and L, and a third (M) directly at the back of the skull. There are two L points, one an each side of the skull. We know that all of these planes are perfectly harizontal or vertical, so we can measure smaller pianes tilting from them.

These points represent our XYZ axis, and we also know that they are the widest, tollest, and forthest-back parts of the head. We know that nothing will go outside of these boundaries. Then we can simply connect the dots using our knowledge that the skull has a boll-like shape (N).





## tip: silhouette ends

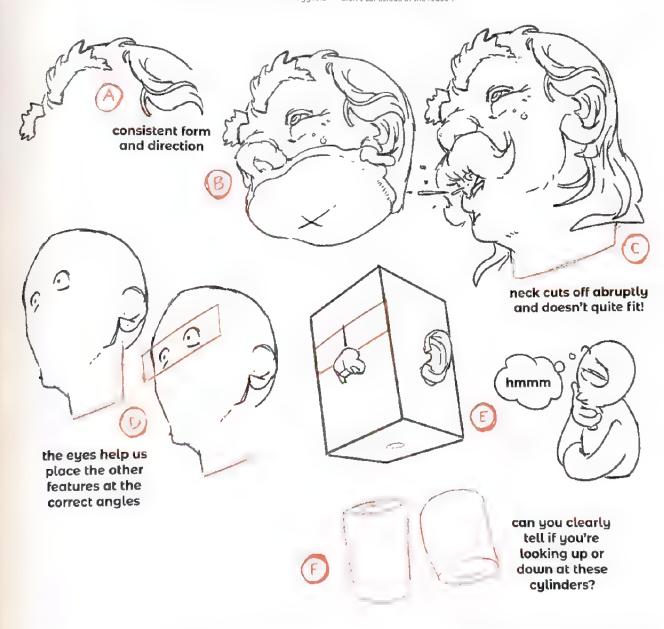
When finishing a portrait, people often finish off the neck in a way that flattens the head's impression of form progressing from A to B, we can see the impression of looking up at this head as we draw. Then, by the time we get to C, we're so pleased to have finished

drawing the head that we simply draw a neck line, as if any line will do! Even when the silhouette ends, it should agree with the rest of the form

Here's another basic head (D) The eyes give us a known variable that suggests

the other features, we draw them from with fewer lines, pay closer attention below, so that we know we're looking — to getting them correct. If we're looking up (E). If you then drow a neck that — up or down at a head or other body looks as though you're looking down part, end the silhouette with a line that on it, it confuses the viewer even if they suggests that direction (F)! aren't conscious of the reason

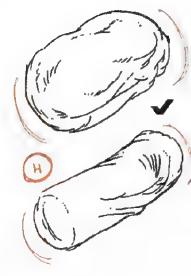
the perspective to us. When we add - As a golden rule, if you are drawing



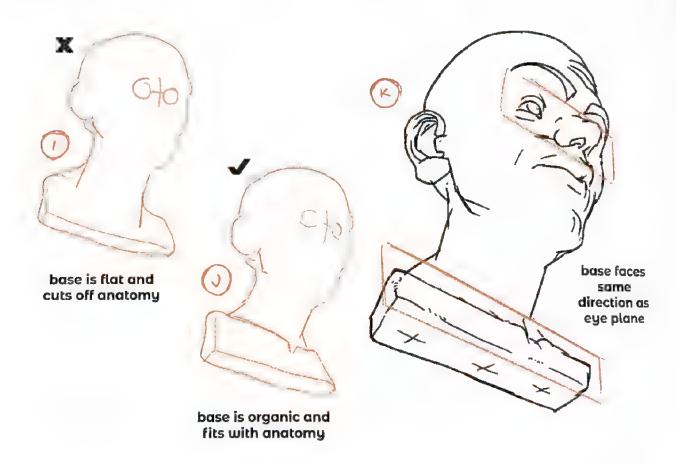
You are the artist and architect of the world you are building and sculpting in Yes, you could draw shapes like G, but why would you choose to? The "silhouette ends," shown in orange, aren't visually pleasing. They don't flow with the form or match with each other. Artists usually want their work to have "appea" and do everything in their power to achieve this. Use every trick you can! Redesign and look for silhouette ends and edges that agree with each other (H)

Why design base I when you can design base J? Strive to match these parts of the drawing with your known variables – in this case, the eye and brow sections – to improve your presentation (K)





ends flow well with form and each other



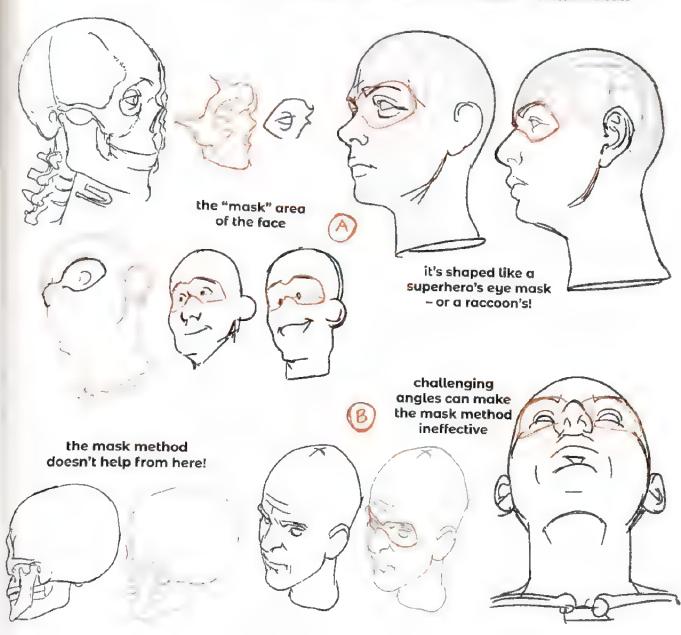
#### e mask

ts look at the face, starting w. 1's often called the "mask" rec , includes the frontal bone no makino (upper Jaw), and 74 banes (cheekbones Don't

worry if these sound a bit daunting we'll cover them in an access ble way

People will often suggest to "draw the mask" on the front of the face with the expectation that if you aim for a — from challenging angles (B). You're not simple shape, it will be easier to draw (A) The problem with this idea is that simple shapes laid on complex forms are still difficult to draw, especially way to approach this area

making the form any simpler with this method - you're just trying to visualize a sticker on top of it. We need a better



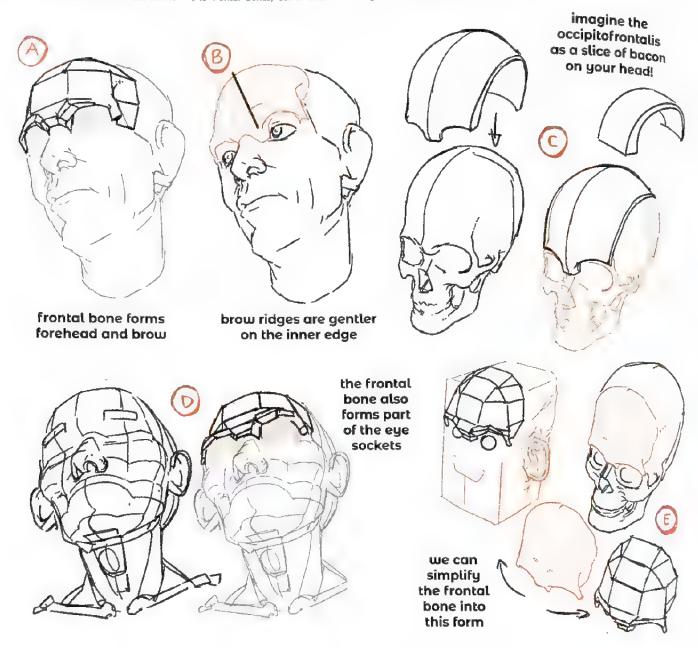
# frontal bone

Let's break down the mask area by first examining the frontal bone (A) This forms the forehead and is the most important bone in the head to learn Sadly, it's also the bone people avoid studying the most! Note how it

wraps around, and also back, but has clear brow ridges that are sharper on the outside and more gently curved on the inside (B). The occipitafrontalis musc e, which connects the occipital and frontal bones, starts thick and

ends thin, with muscle at the front of the skull and tendons at the back. Imagine someone has laid a piece of bacon over the top of your head (C)! The frontal bone forms the roof of the eye sockets (D). This bone has a large

volume and many graceful curves, but these can be simplified down to a model approximating E, with three main sections angling upward.

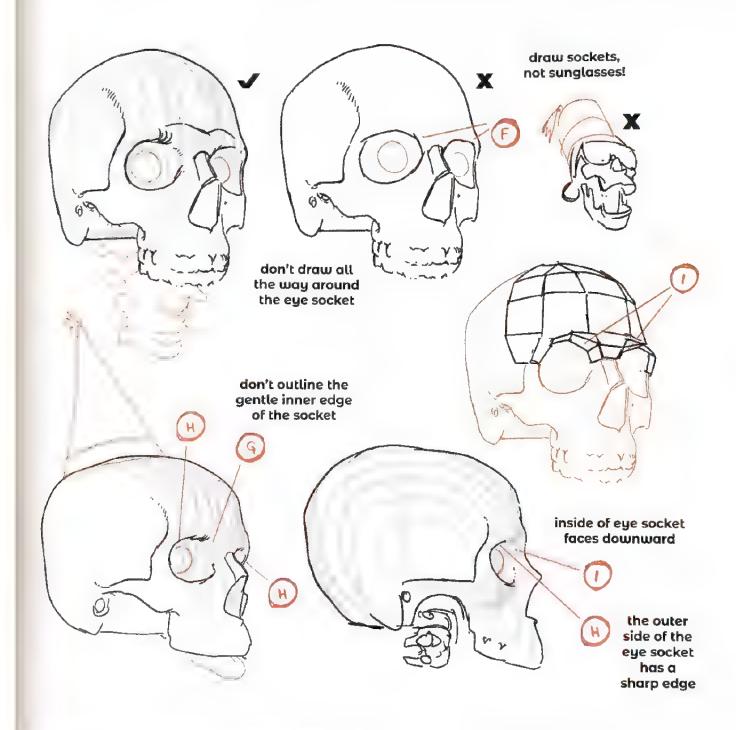


When drowing the brows, don't complete the inner-edge shapes (F) full that, it'll look like your skull is we, and sunglosses! That's drawing a shape not the form. The inner eye

socket has a gentle curve inward, so you don't need to draw a line there, because you'd be representing a delicate curve with a harsh edge (G)

There is a sharp edge on the lateral (outer) side of the eye socket, where the bone is very narrow (H). You can feel this on yourself quite easily. This is where the frontal bone meets the

zygomatic bane below it. Remember to clearly sort your downward planes from your upward planes. There's a strong downward plane on the inner edge of the eye socket (I).

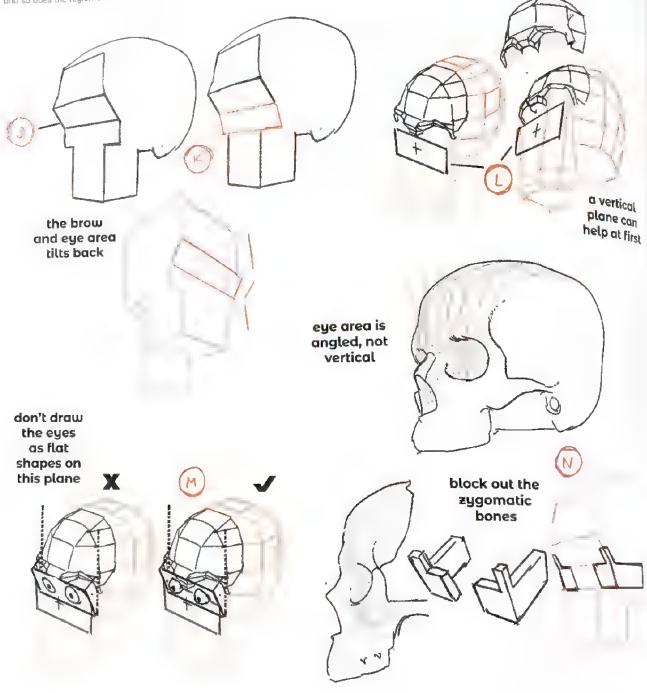


Let's move on to the egion directly below the brows. Before we get into the bones it's worth noting that the brow region tirts backward in space... and so does the region below it (K). If

you're having difficulty judging the angles of the slopes, it can be helpful to slide a completely vertical plane into place under the brows first (c), then build the new plane out from there

If you draw the eyes as flat shapes on this backward-tilting plane, they will look odd (M) Make sure they are represented as spheres that stick out from this downward plane

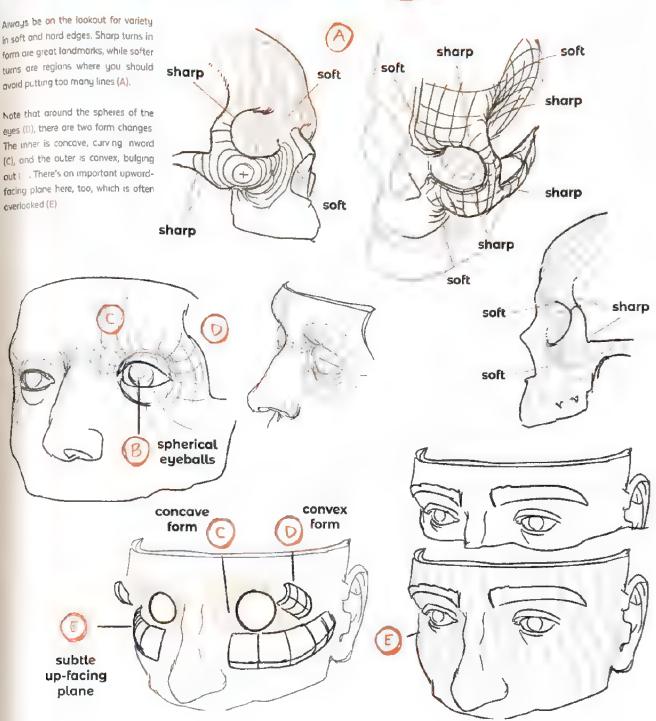
Plane J represents the moxila and a suggestion bone. Let's add to a suggestion bones first by adding the two blocky forms onto the outside this simple "T" shape (h).



# soft & hard edges

in soft and hard edges. Sharp turns in form are great landmarks, while softer turns are regions where you should avoid putting too many lines (A).

Note that around the spheres of the eyes (B), there are two form changes The inner is concave, curving inword (C), and the outer is convex, bulging out ( . There's an important upwardfacing plane here, too, which is often overlooked (E)



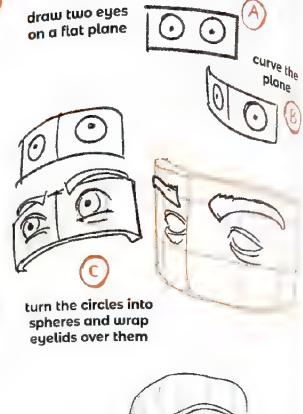
# adding eyes

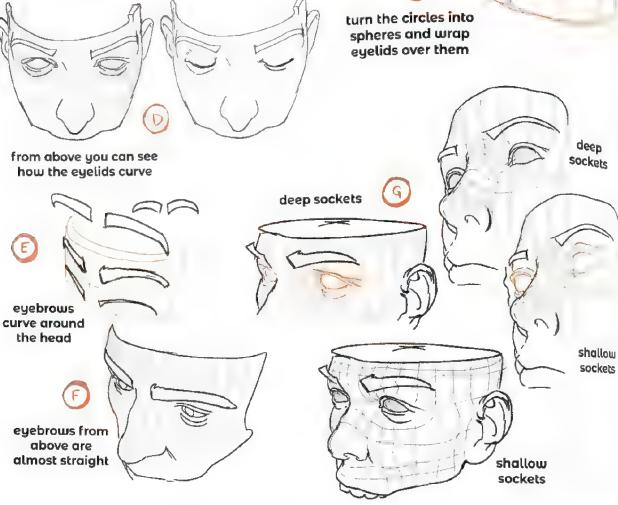
To draw the eyes, start with two circles on a flat plane, as if they're on a piece of cord (A). Curve that card to represent the curvature of the face (B). Finally, draw spheres instead of flat eye shapes, and wrap eyelids and eyebrows over the curved surface (C).

When viewed from above, if the eyes are looking up, the line of the eyel ds will appear flot, but when the lids are closed you can see how they wrap around the spheres of the eyes (D)

magine the eyebrows are flat stickers curving downward (E), then imagine them stuck onto a curved surface, so they wrap backward too. When looked at from above they appear as almost straight lines (F)

In G you can see how the amount of the zygomatic bone visible from the side depends on how deeply set the eyes are, if the eye sockets are shallow, the eyes bulge out over the sides; if the sackets are deep, the opposite is true





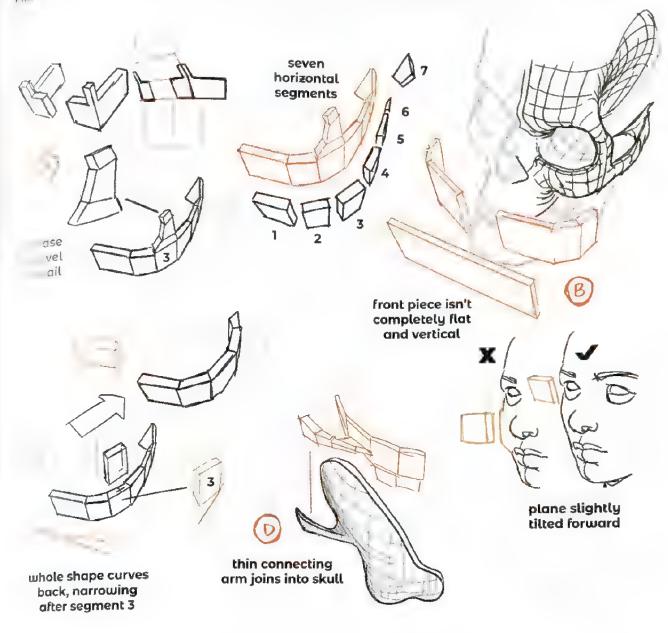
# zygomatic bones

Let's increase the level of detail into omething more realistic for these two smaller shapes that we blocked out age 96 (A) The front section stays that forward, but we can curve and

smooth the rest until we have more segments – a total of seven (1–7). The first segment is titled forward at the top and gently angles back to the side (B). The whole cheekbone piece curves

backward around the head, but isn't fully side-on to the front of the face (C) It generally widens to the third piece (3), then starts to curve back inward from the fourth. Note the small angled

tail at the end of the shape, where the arm of the temporal bone merges into the side of the skull (D). If this seems complicated, be patient – we'll look at this whole form in more detail next!

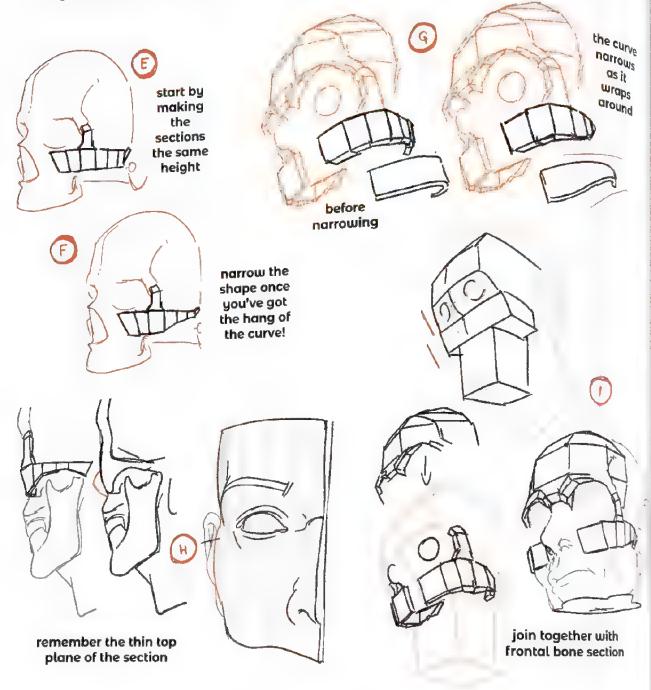


A good place to start is by drawing each of the six main sections with equal heights until you get their tilt and curvature under control (E) From there, you can progress to narrowing them as they curve around toward the

bottom of the side of the skull (F). This will feel awkward to draw from below because the curve is not only wrapping around the head, but getting narrower, so you won't see as much of it as you might think (G)

You'll actually see a lot of this form wrapping around the side of the face when looking at the face from an off-center angle. Note the top-facing plane, which is only small, but appears like a small ledge (H).

By piecing together our new cheekbone section and the forehead bone we made on page 94, we can create a workable base for the top half of the head (1)!

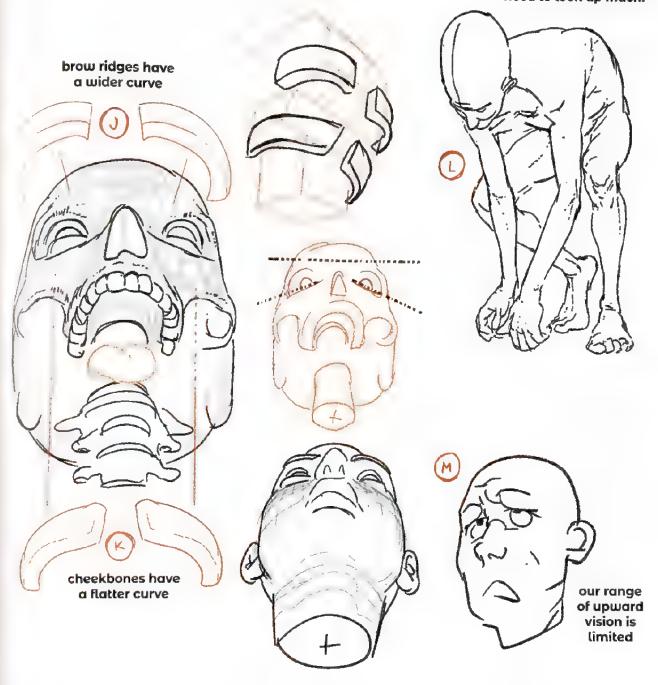


The forms representing the zygomatic bones are angled more sharply backward than the brow ridge, which you can see clearly when viewed from below. Comparing J (brow ridges) and K (cheekbones) you can see the cheeks

have a more gentle and flattened curve than the brows, which are wider and project farther. Why is this? It's because our hunter-gatherer ancestors spent most of their time in a world where their food, mates, and prey were

of around eye level (L). We don't have much need to be looking up, so we have a great range of vision ahead or below us, but limited vision when we turn our eyes upward (M)<sup>1</sup>

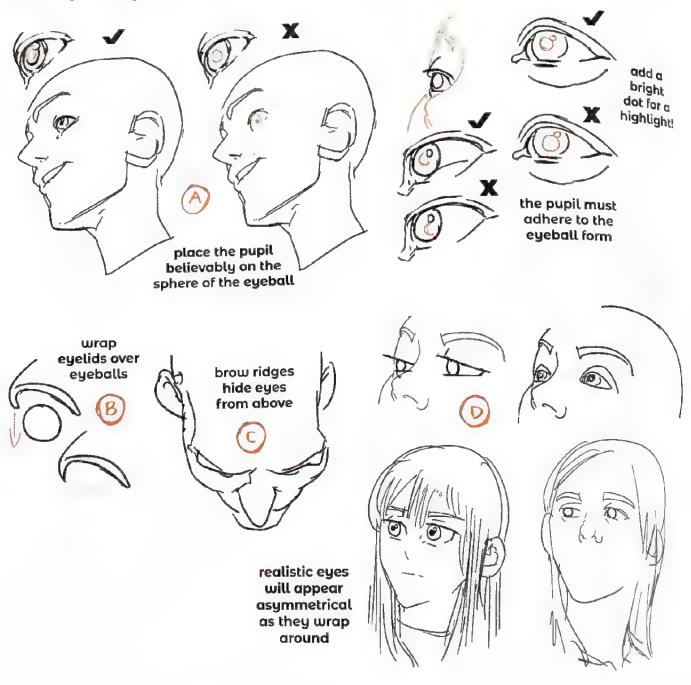
our ancestors didn't need to look up much!



## refining the eyes

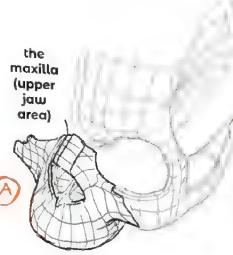
When drawing the eyes themselves, be very careful where you place the pupils (A). If you rush them, a wellconstructed eye can change into something formless. The eyes are tricky, and as always, it's the tricky areas that require the most attention. Make sure the lids wrap around the spheres of the eyeballs (B). From above, you will barely see the eyes, or not at all – resist the temptation to

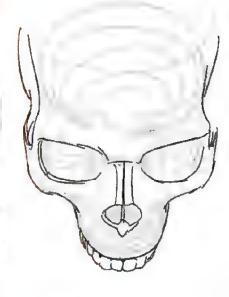
draw them (C). Don't make the eyes symmetrical from an angle such as D - we would see much less of the forther eye as the face curves away!



ne upper jaw

Now let's look at the maxilla (A), t has a scooplike shape that can be simplified by drawing a curved form, then breaking that form into eight sections On top of this we add another form that creates the arched support for the roof of the mouth (C). We re breaking this skull down into the simplest forms manageable, so let's add that roof now, even though we won't see it from most external views. Imagine it popping neatly into place in the curve we've made (D).

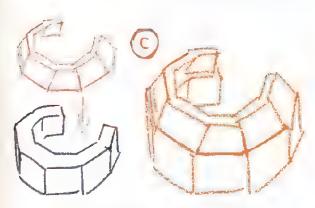




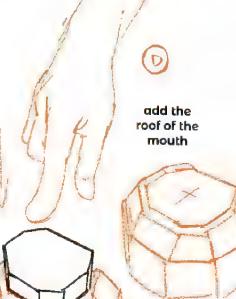




create a curve with eight sections



add another curve on top, narrowing inward



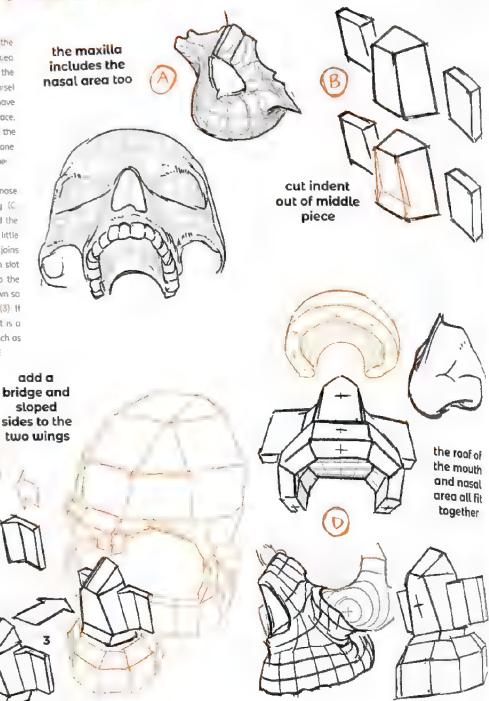
#### nasal bones

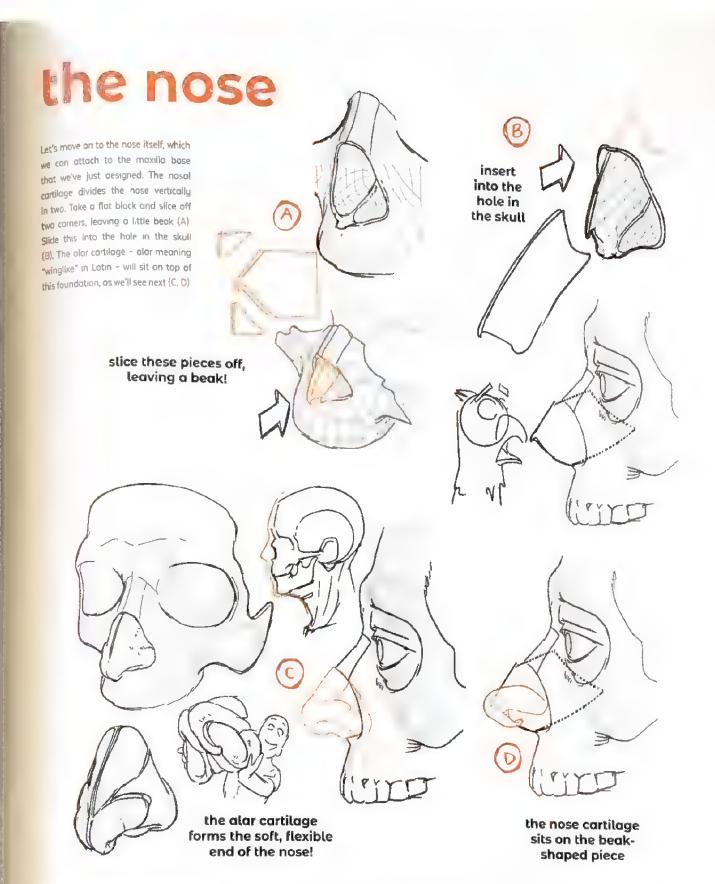
The max to encompasses not only the Loper jaw, but most of the nose alea. Let § black out the shape of the nose banes by starting with B. Chisel a section from the front, so you have a sight slope at the front of the face, then add two "wings" for where the max is meets the zygomatic bone.

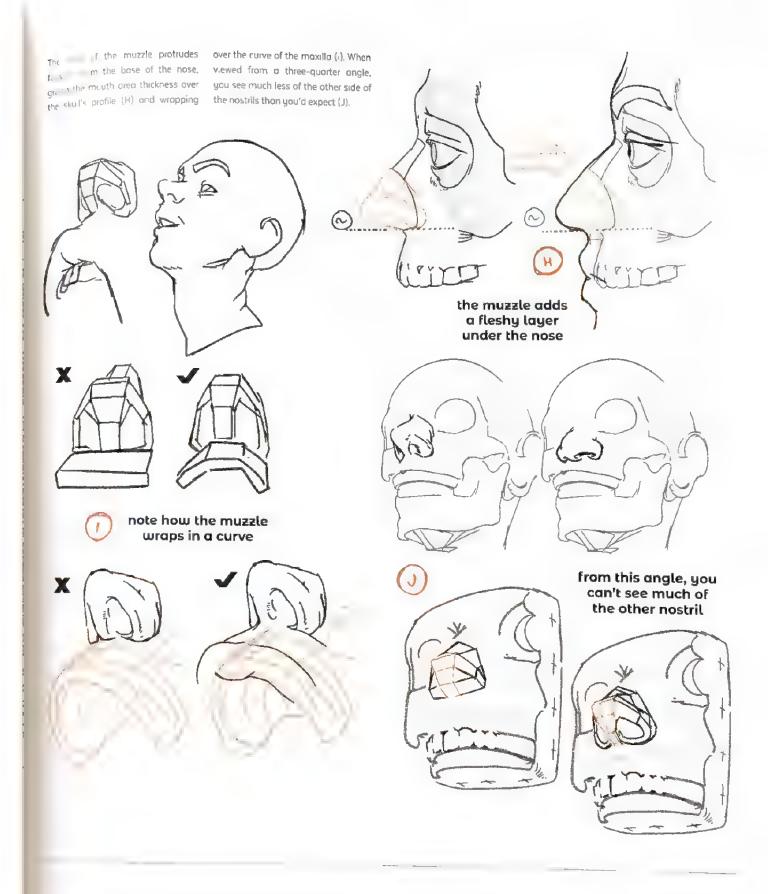
We now have our first basic nose bone but it needs complexity (C

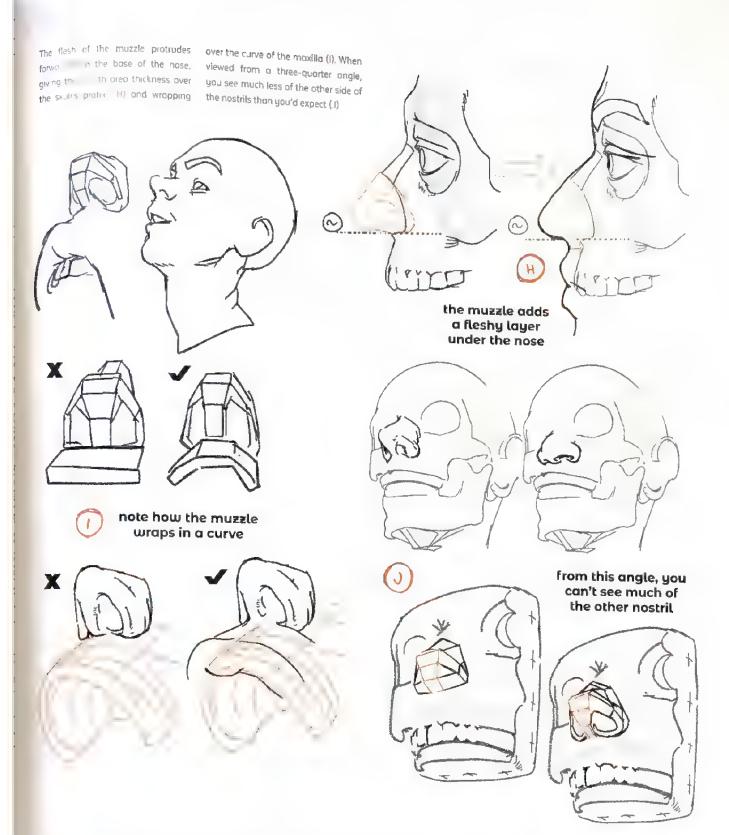
That's as simple as this area can be-

On the top of it, you can add the two nosal bones either side of a little supporting wedge, and angle the joins of the two side wings (2). We can slot this blocked-out nose piece into the gap provided by what we've drawn so far, completing the upper head (3) If we have the foundation, the rest is a matter of adding details (D) – such as the nose, which we'll look at next!





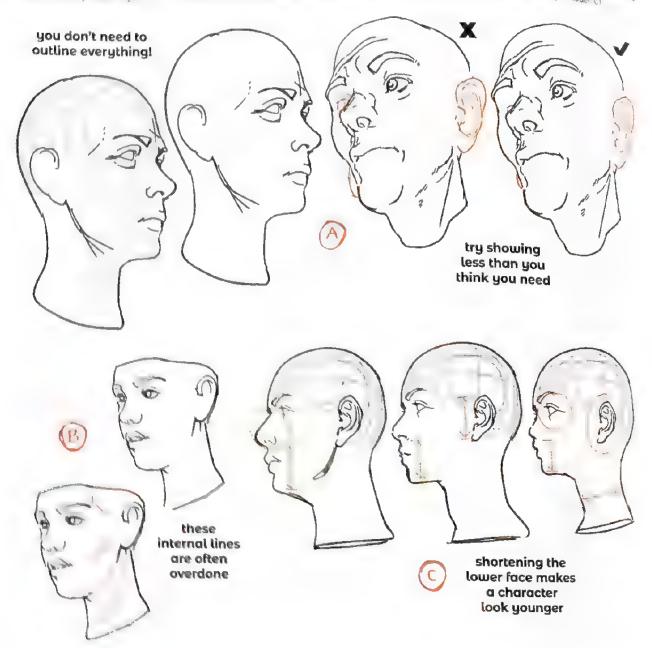




# tip: indicate, don't state

corrections then show a tiny fragment one looking at one turning in space This is visually interesting to the

If it is true that less is more, if viewer by suggesting forms they for one smare whether you'd see can't fully see, as if the forms they and continue out of sight. Avoid these commonly added lines that usually detract from a good portrait (B). For a simple way to make a face appear younger change the proportions. Keep the head size similar but shorten he length of the jaw and nose, You don't need to do much more than that to create a younger moder ()



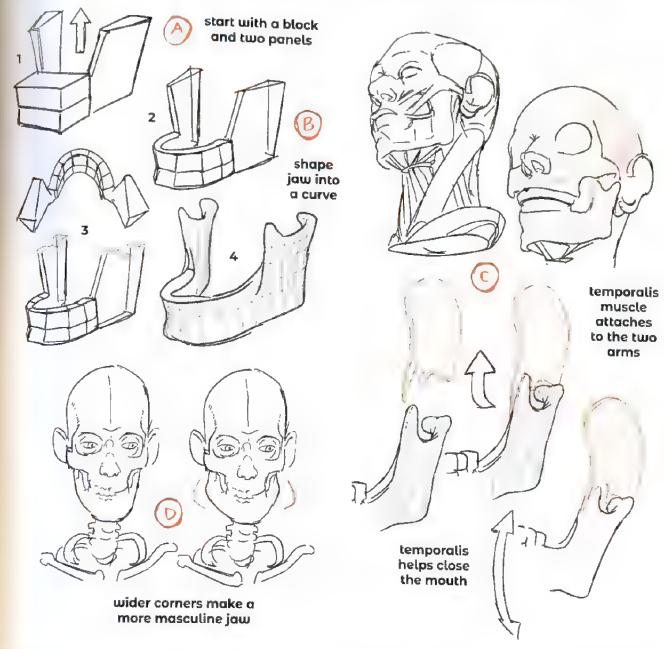
### lower jaw

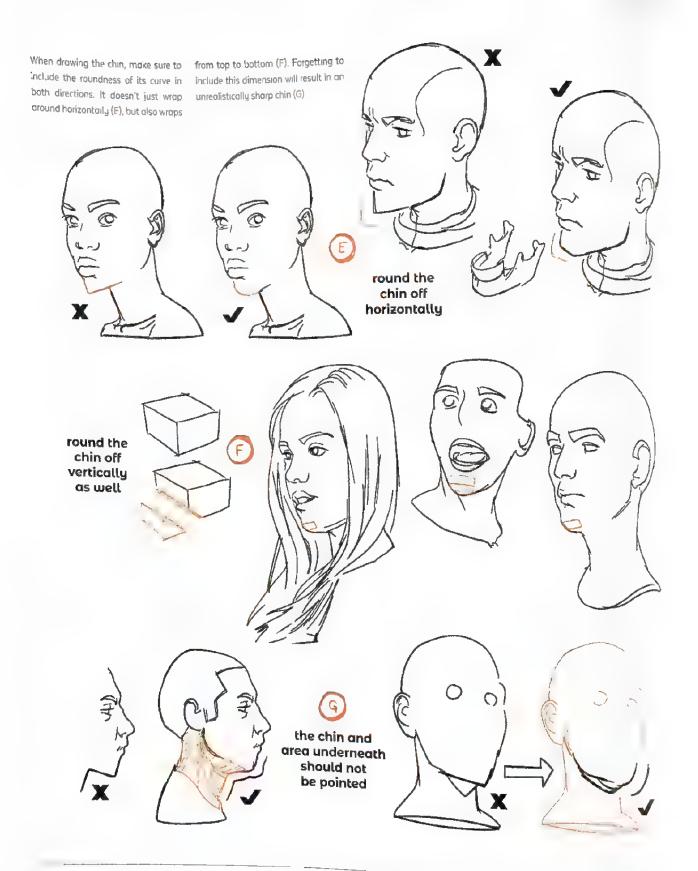
To draw the lower raw (mandible), start with a blocky form for the section holding the teeth, then add two panels to the back (A). These panels flare up

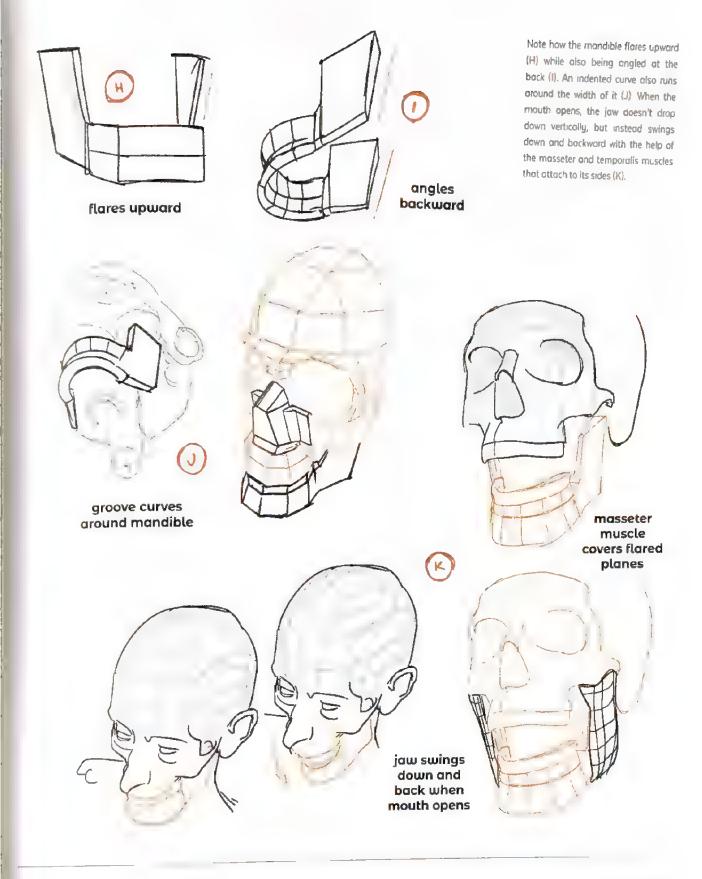
and widen toward the back. From here, we can chisel the blocky section into a rounded piece like the maxilla, and add a notch to the two panels (B) The temporalis muscle attaches to the side

of the skull and to the very front of the "arms" of the mondible (C). It pulls up and assists with closing the mouth and chewing. To draw a more typically masculine model, you can flore the Jaw.

out at the back corners (D) This width gives a more powerful look to the head A more typically feminine jaw would be the opposite

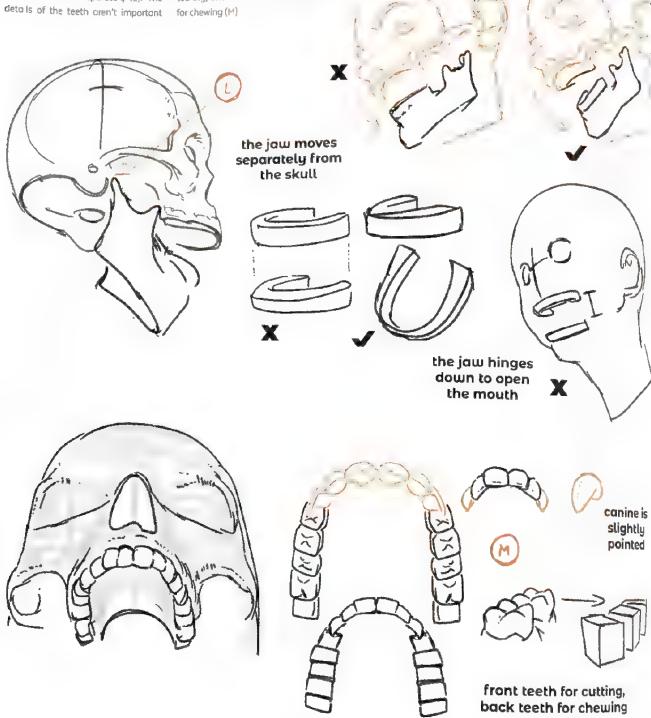






Here you can more clearly see that the rear section of the jaw, where it meets the temporal bane, detaches from the skull and moves separately (L). The details of the teeth great important

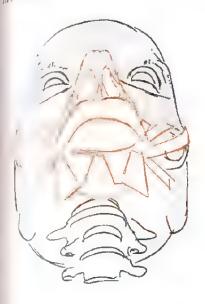
to learn for figure drawing, but you should know that the front six of each jaw are generally sharp (for cutting and tearing) and the rear teeth are blocklike for chewing (M)

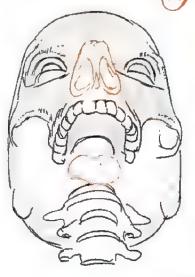


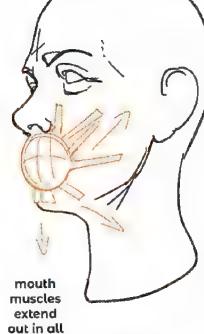
## mouth & lips

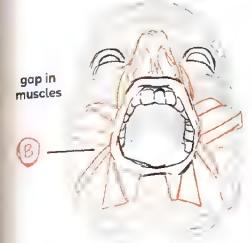
Wher sowing the I ps, remember that th has to open in all directions. a muzzle laid over the front of » with muscles expanding out artions (A).

However, there is a small gap without muscle, beneath the zygomatic bone (B), which stands out as a small depression on muscular faces with a lower percentage of body fat (C).

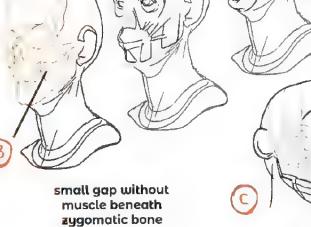












directions



gap is visible on lean faces

The corners of the mouth affect expression, so position them carefully. Notice the difference between the examples in D and  $\boldsymbol{E}$  – when we're happy, the comers of the mouth lift up, but if we're at the dentist, the corners remain lower. When the comers of the mouth pull back, the curvature of the teeth is revealed, which we can indicate by adding shadows to this region (F) The line dividing the teeth is rarely positioned exactly across the center of the mouth. You'll usually see much the corners of more of the top row of teeth (G). The the mouth have lips and surrounding muscles have a huge impact a lot of thickness, so make sure they on expression project out in front of the teeth to show Volume (H) E shade here to add depth around teeth lips should upper teeth are have a thick usually more visible volume over

the teeth

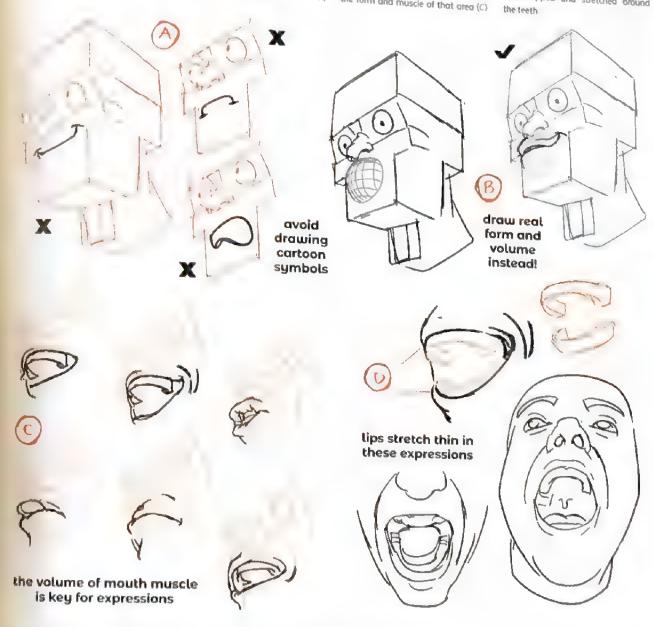
## forms, not symbols

When seeing how appealing mouth shapes can be in cartoons, we may be tempted to draw symbols rather than forms. That can be the most efficient way to communicate an expression.

quickly in storyboards or cartoons, but symbols lack form (A) instead, give the muzzle area valume and roundness in a larections. The mouth wraps around this rounded form,

leaving some space between the teeth and the outside of the lips (B). That breathing room between the teeth and front of the lips is key to conveying the form and muscle of that area (C)

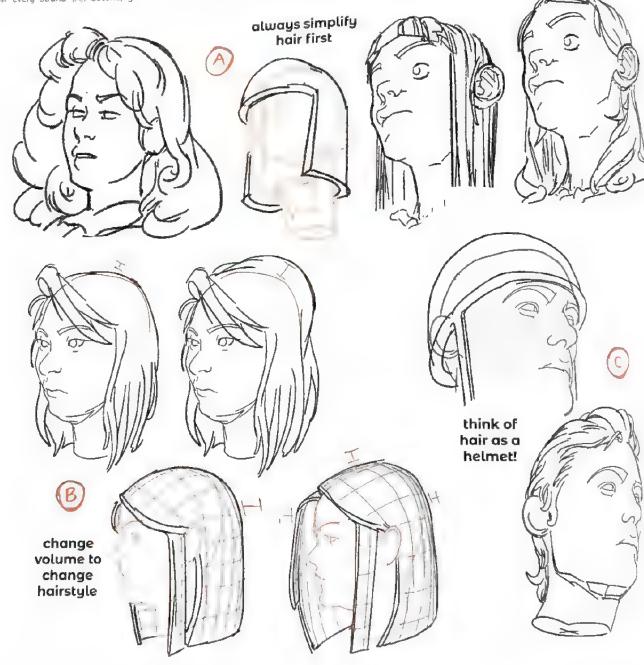
However, in expressions like D, with the mouth wide open in shock or to shout, the aps appear narrower because they are wrapped and stretched around the teeth.

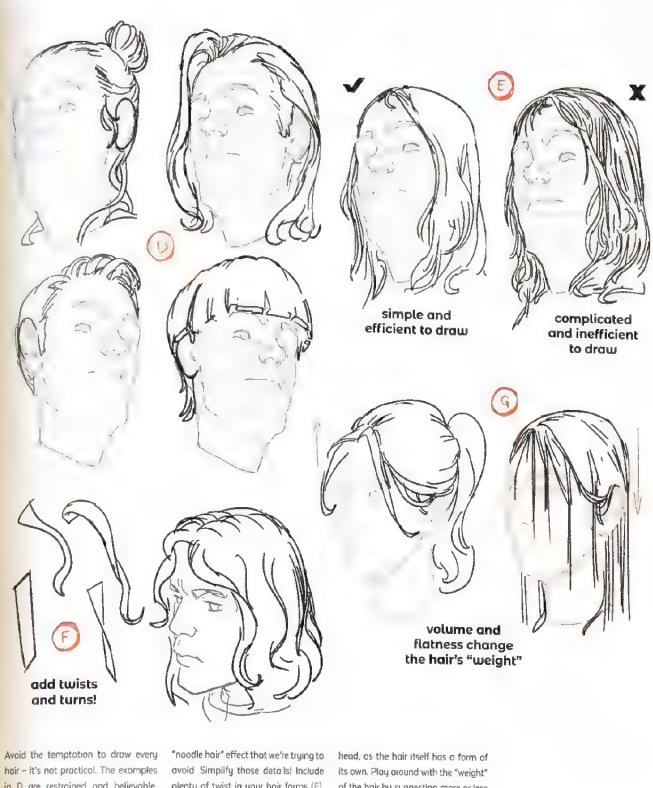


## adding hair

When adding hair to the head, I have two main tips. First, you must be able to simplify the hairstyle into a few simple forms, rather than trying to draw every strand (A). Second, you must know how far from the skull those simple forms are sitting - the "volume" of the hor (B). Much of the "style" of a haircut comes from changing the variety in distance between the skull

and the outer edge of the hair. Treat drawing hair like you would a helmet. t sounds simplistic, but it's the only way to approach such a complex form (C). Ask yourself, "Am I totally clear on the shape of the skull?" Struggling to drow hair is usually a sign that  $y_{OUR}$  not sure what is beneath it.

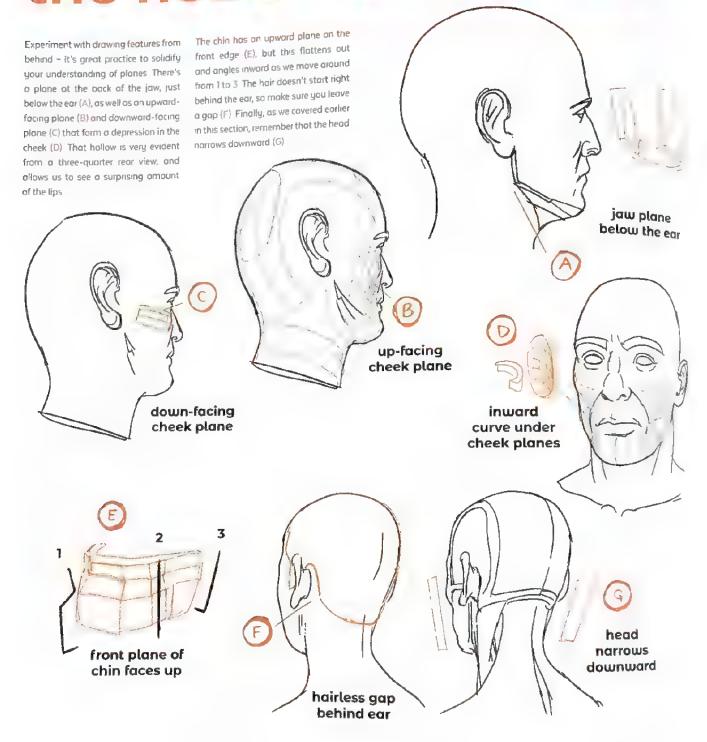




in D are restrained and believable, while E shows the overcomplicated plenty of twist in your hair forms (F) Hair masses rarely fall flat against the

of the hair by suggesting more or less volume (G).

## the head from behind



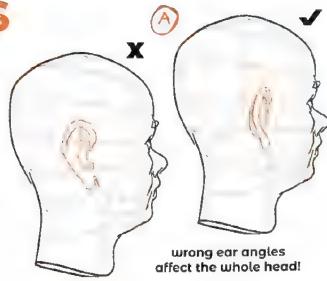
adding ears

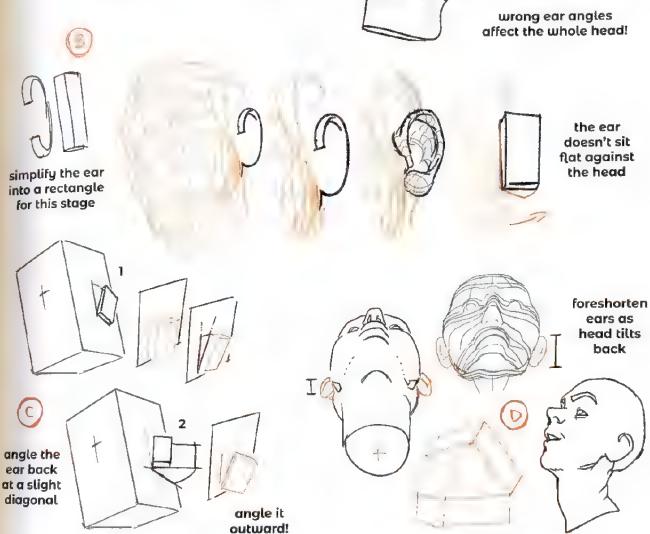
Most people drow the ears last, as an afterthought, but the ears' placement and angle are important. Changing the rotation and placement of the ear just slightly can appear to rotate the whole head. (A)<sup>1</sup>

We don't want to drow the ear flat against the side of the head - it needs to angle both slight y out and slightly back. B To do this, angle the whole ear

mass backward so it sits at a slight diagonal on the head, then swing it out I ke a barn door! This can be tricky to visualize at first, but very effective once you grasp it (C)

As the head tilts back, the height of the ears is compressed and foreshortened, remember to flatten the ears even more as the head tilts farther back (D)

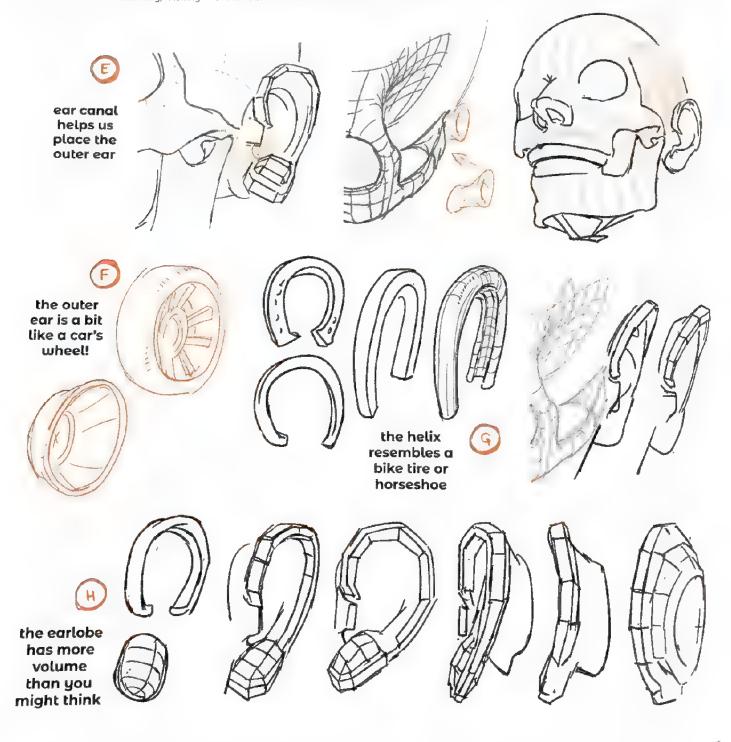




The tube-shaped ear conal angles down and into the skull through the temporal bone, just behind where the jaw attaches. Though we can't see the ear conal externally, knowing this attachment point helps us locate exactly where to base the ear  $\{E\}$ 

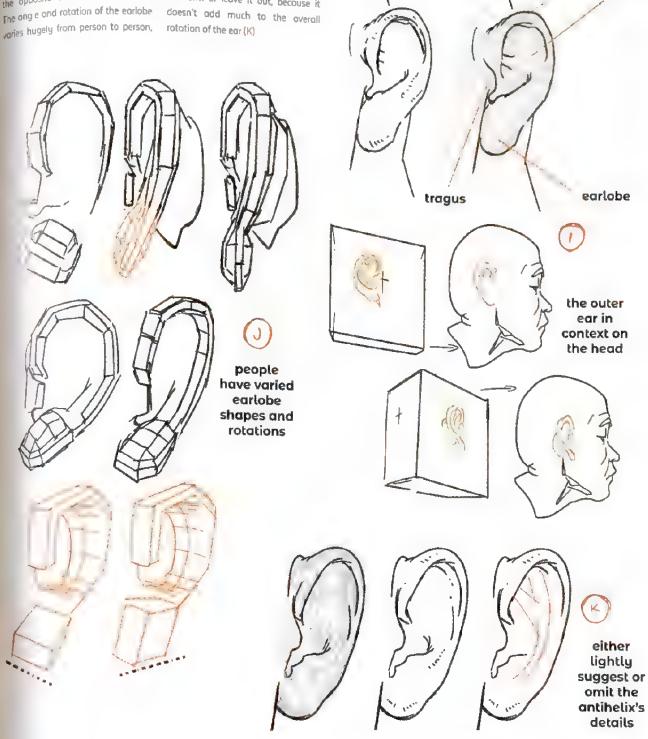
The whole ear is a bit like the wheel of a car (F). The top section (the helix)

angles out as we move back, and is basically a horseshoe shape. Closer inspection reveas it has a roundness like a bike tire, which helps us catch sound waves (G) Give the earlobe region more volume than you'd expect (H). Earlobes have some mass to them, but you don't tend to see it because it's most deorg visible from below



The external ear (I) consists of the earlobe, helix, tragus, and antinelix,

but I like to draw it as almost a jewel shape (J). Avoid drawing the antihelix which is so named because it runs in as a couple of lines. Either represent the opposite direction to the helix the form or leave it out, because it

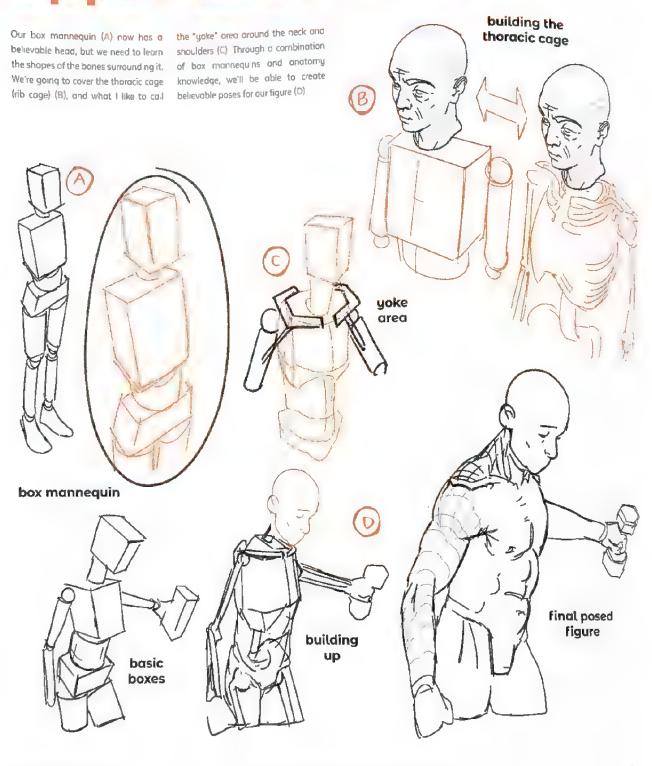


helix

antihelix

# lesson 2: Uppper Uppper Uorso

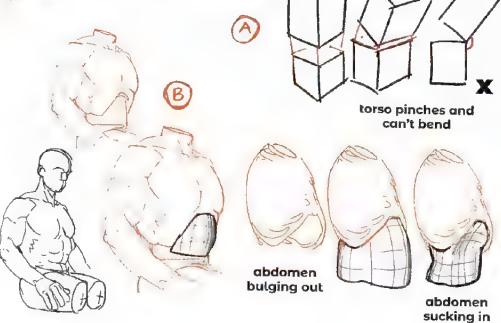
#### upper torso & yoke

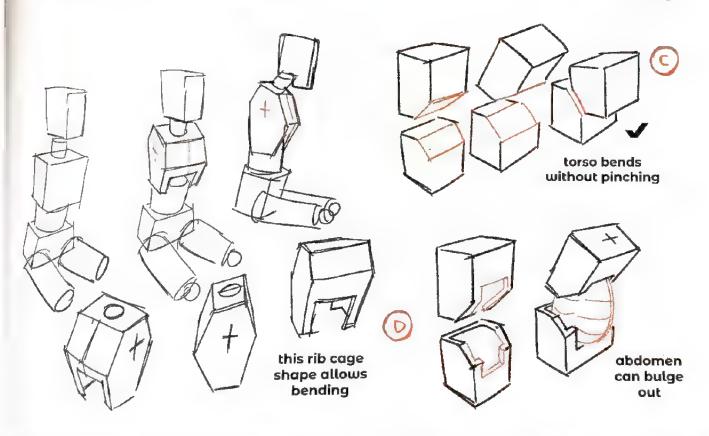


#### r b cage

It's difficult to memorize forms without understanding what they need to achieve. Start by asking yourself, "What do these forms need to be able to do? What do these muscles or bones need to

The torse must allow for expansion in body for and muscle mass, but must also be able to bend in multiple directions. We need to be able to bend forward without our bodies pinching (A), and also have scope for the body to "blue" out with muscle and fat (B). For this pason, the rib cage is higher at the center. The shapes in C allow the body to bend forward without pinching the organs, but where would the soft mass of the torso go? The answer is D, which allows builging.





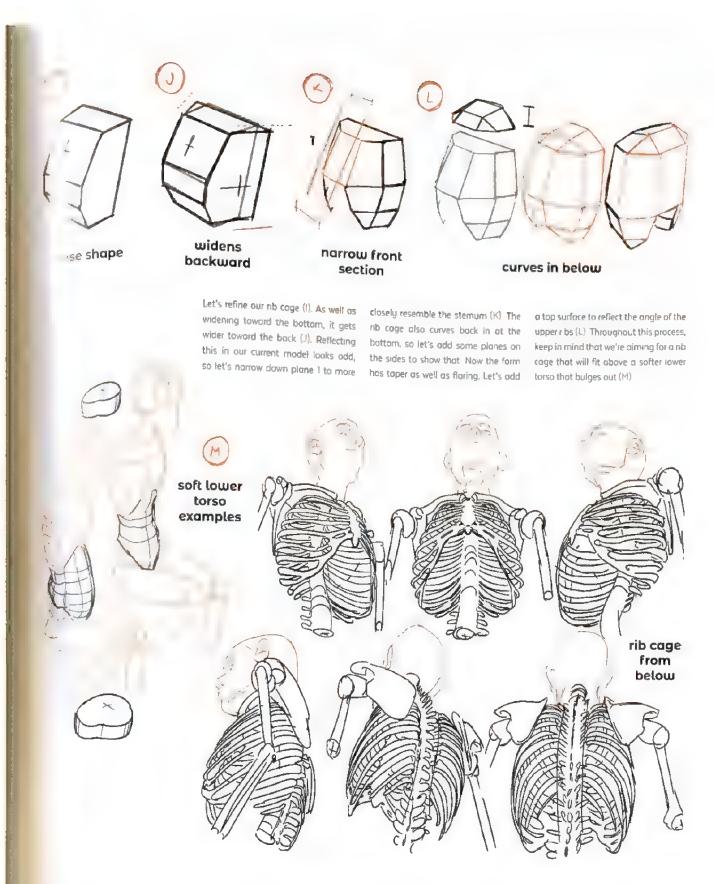
We can think of the rib cage as a container that protects the lungs and heart. Start with E and take slices off the front to create three plones, numbered 1, 2, and 3. The top plane is the longest and represents the more toward the bottom (H), so allow sternum (breastbone)

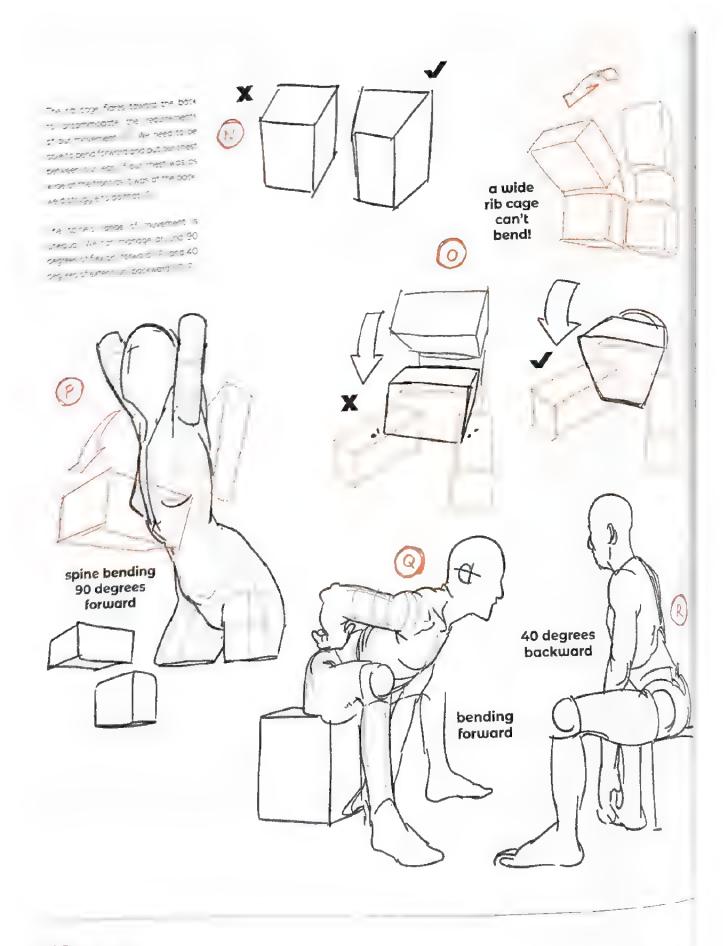
1

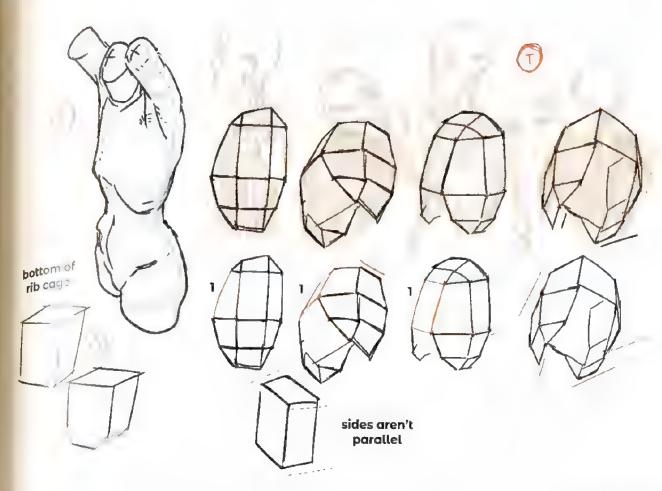
Observe in F the change in the planes' direction through 1, 2, and 3. The rib cage also flares out at the bottom while being norrower at the top (G) Some people's rib cages flare out even for some variation in your figures

plane changes







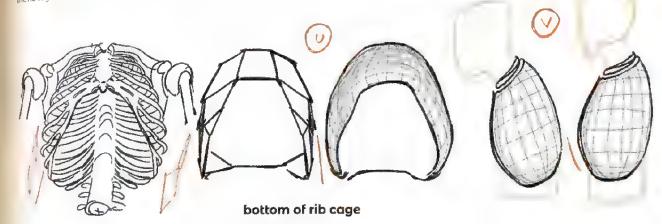


and if you drow it incorrectly it will therib cage istricky, as it widens toward

Don't rush the rib cage. It's difficult to the back but also curves in toward the draw and doesn't have obvious corners, spine (S). Plane I now has a slight curve and taper to it. The sides of the rib usually be noticeable. The bottom of cage aren't parallel, as you can see in T and U. When you bend forward, the

bottom of the rib cage rotates into the mass of the abdomen, hiding the downward-facing bottom plane (V).

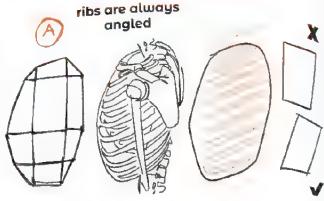
plane rotates into abdomen

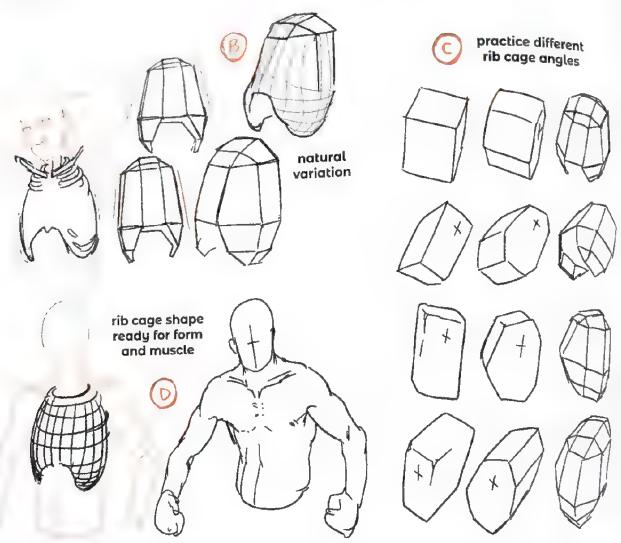


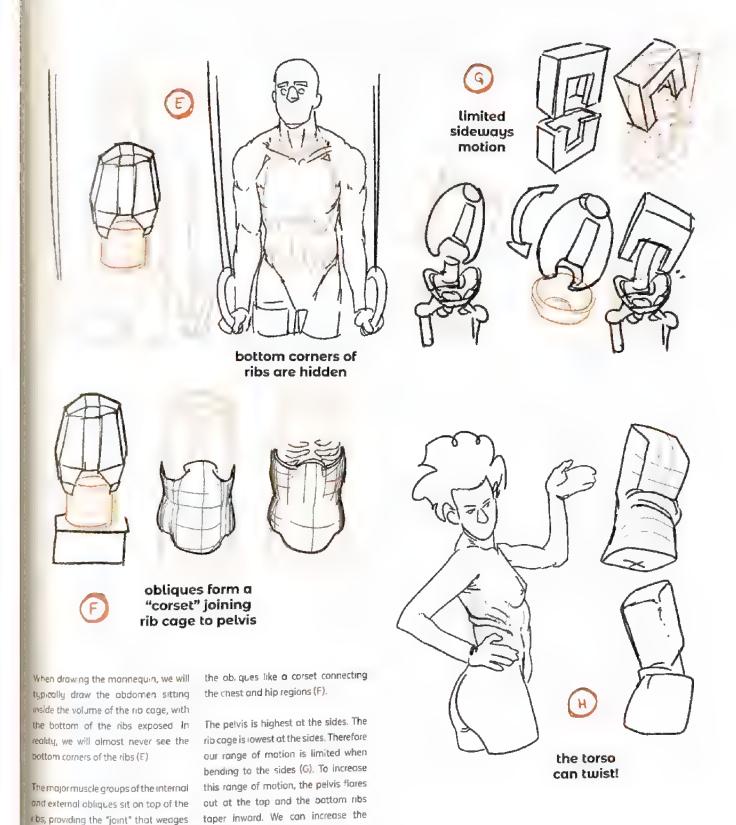
# torso shape & motion

again toward the spine. There is nib cage, how do we begin building variation in how flored the ribs are, but flyou stick with this general shape, the results will look realistic. For example the rip cage shopes in B are slightly different but all correct

There's a strong backward angle to the Practice drawing the rib cage from different angles, with the narrow top slant up and back. A few at the bottom and sternum widening toward the of the sternum drop down first, but back and bottom (C But now that they will still swoop around and up we've learned about the shape of the form and muscle on top of it (D)?







range of motion further by twisting (H)!

the pelvis and ribs together. Think of

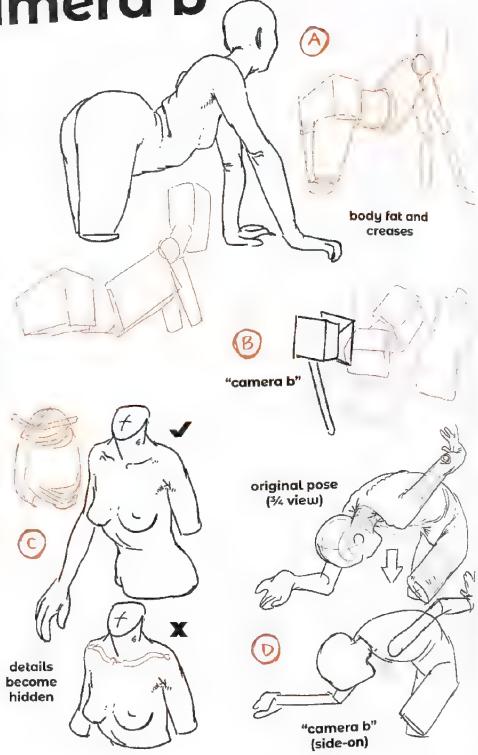
tip: camera b

When we focus on individual muscles, we must also keep the whole figure in mind After all, the whole figure is our ultimate goal, not learning every muscle and attachment! Always visualize forms from another angle—let's call it "comera B." This will help us visualize the folds formed in the skin and body fat

Body fat is an important part of the figure – without it, all of the people we draw will look like bodybuilders or anotomical diagrams. The folds in A are there because I visualized the model from "camera B" and realized that a bend in the major forms would cause creases in the skin (B)

We'll cover the clovicles (collarbones) shortly but, for now, know that we rarely see much of them from the surface. Suggesting them, rother than stating them, is much more powerful (C) Like parts of the rib cage, they become hidden as we build our figure

When it comes to fot, skin foods, and soft tissue, make a habit of thinking what "camero B" might see from a slightly different view (D)



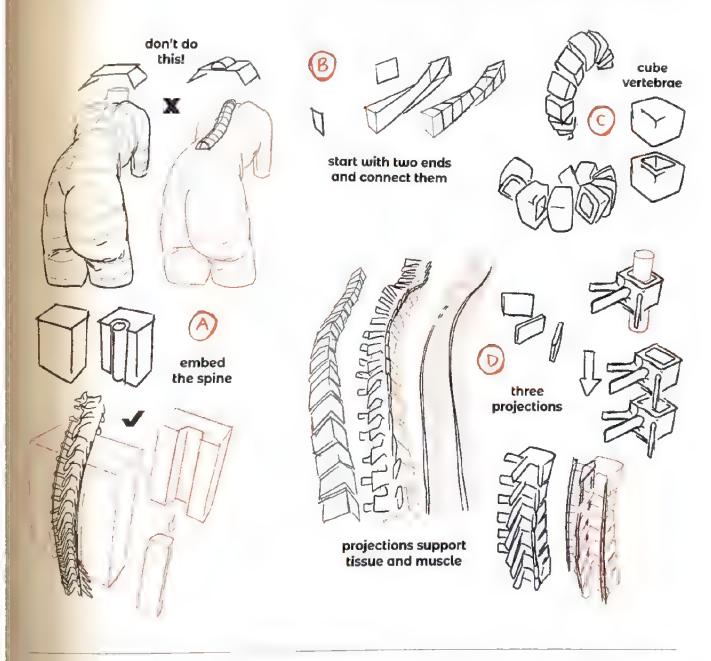
#### the spine

It isn't necessary to know every detail of the spine, but it's useful to understand its role and basic structure. Don't draw the spine as a cylindrical tube stuck to the back (A). It sits within a groove in our nb cage, so make sure you embed it into the body

easier to visualize its bend and twist when we use edges and corners. Start with the two ends of the form and join them together, starting from the corners (B),

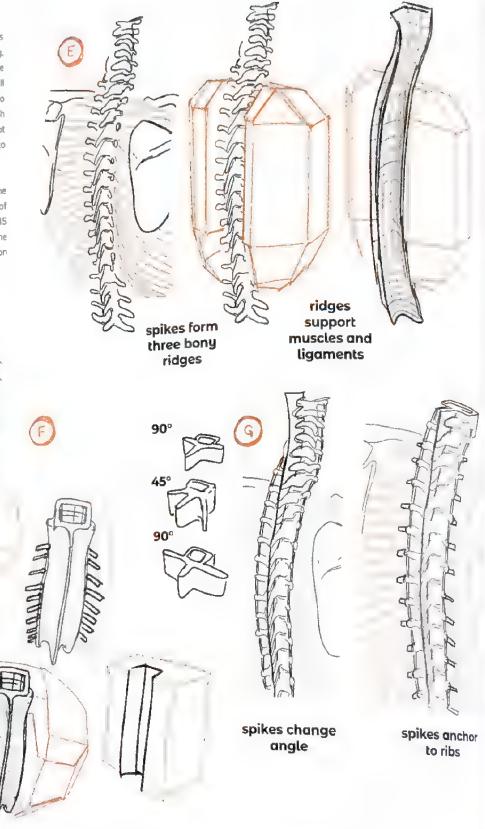
connected by muscles and ligaments Start each vertebra as a cube form, then hollow out the inside (C). The hollow spinal column exists to support and protect the delicate spinal cord that runs through it. Attached to each

hollow vertebra are three projections that are joined by connective tissue (D) These give strength to and act as flexible anchors for the muscles of the spinal column. Without these spikes, we wouldn't be oble to extend our backs at all!



So what role do these three projections from each vertebra fulfill? To simplify, think of these spikes forming three ridges along the spine (E). Small connective muscles join the two outer ridges to the rib cage (F), which anchors the spine and ensures that any twist in the spine is transferred to the rib cage

As we move down the spine, the vertebrae become wider. The sides of the ridges move from 90 degrees to 45 degrees and back again by the time we get to the lumbar region (the region between the ribs and pelvis) (G)



spine is anchored to ribs

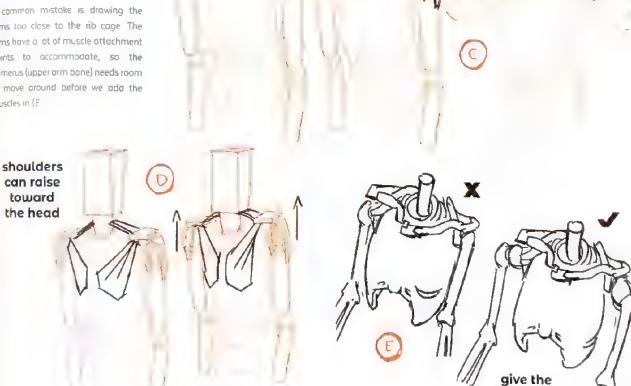
### choulders

The yoke, or shoulder girdle, is corr. I of the scapulae (shoulder blad Ha the clavicles (collarbones) We I these to rotate our figure's arms and raise or lower them relative to the no cage. Let's start with our simplified hib cage shape and two

If we attached the arms directly to the rib cage , we'd only be able to move our arms a little. We'd be able to pull our arms in toward us, but we wouldn't be able 'aise them! For that, we must add on extra attachment point for the muscles. This provides an anchor to pull against to raise the arms. It also gives us an anchor to pull down or up, relative to the head, if we want to raise or lower the whole orm (D)

A common mistake is drawing the arms too close to the rib cage. The arms have a lot of muscle attachment points to accommodate, so the humerus (upper arm bone) needs room to move around before we add the muscles in {E

toward



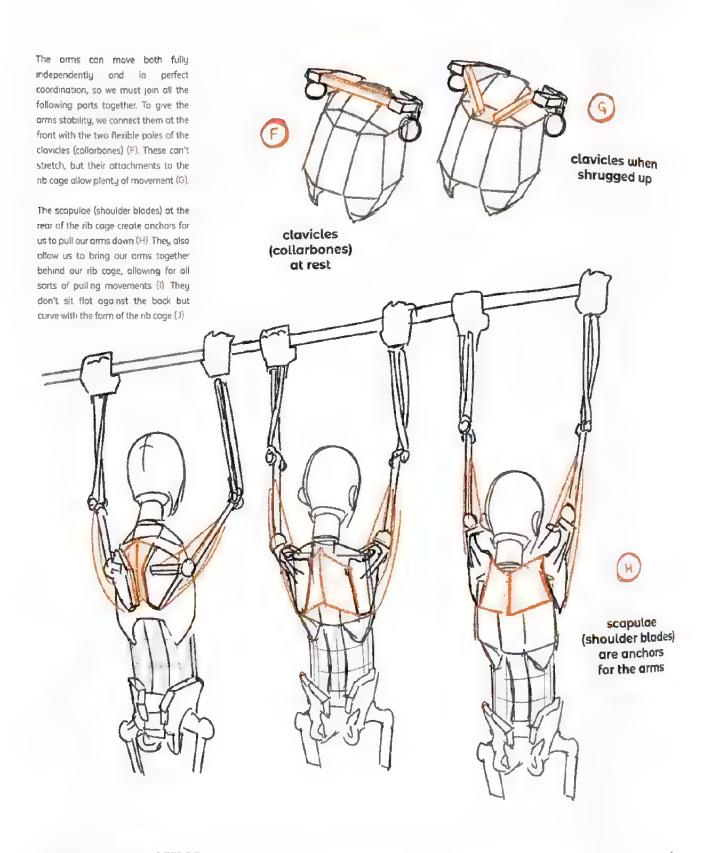
yoke area

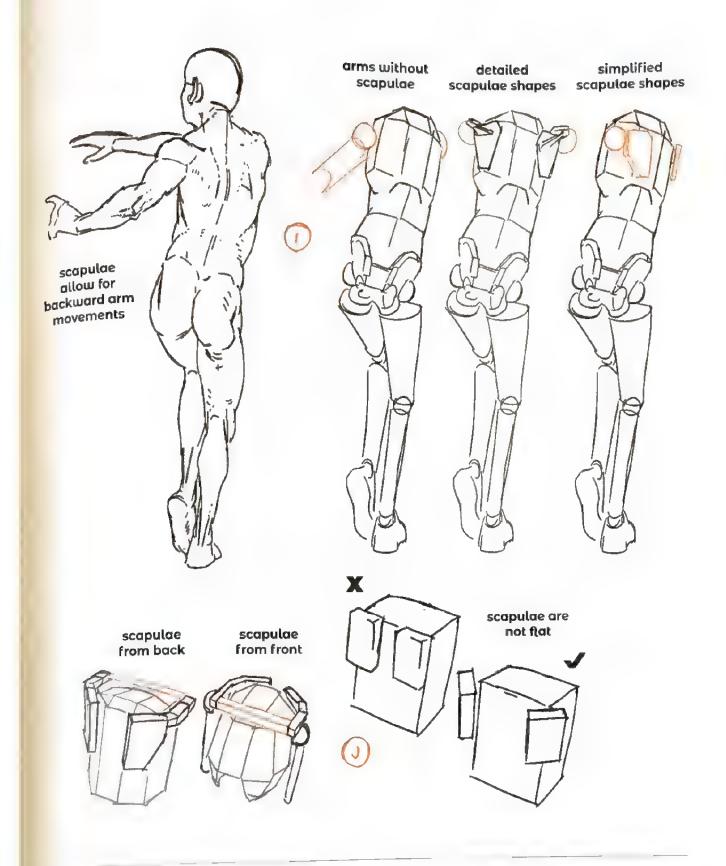
arms space

no upward range!

properly

anchored

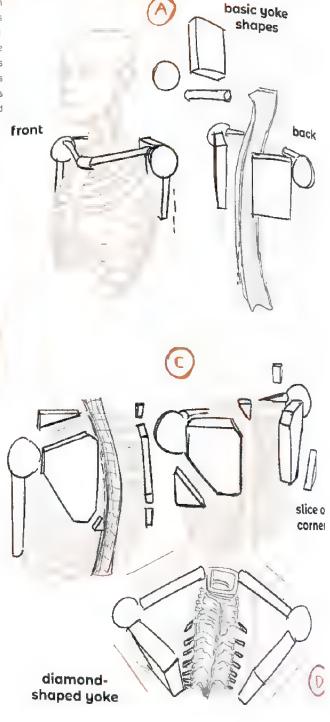


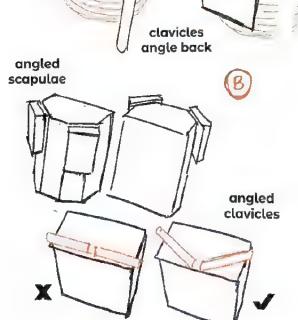


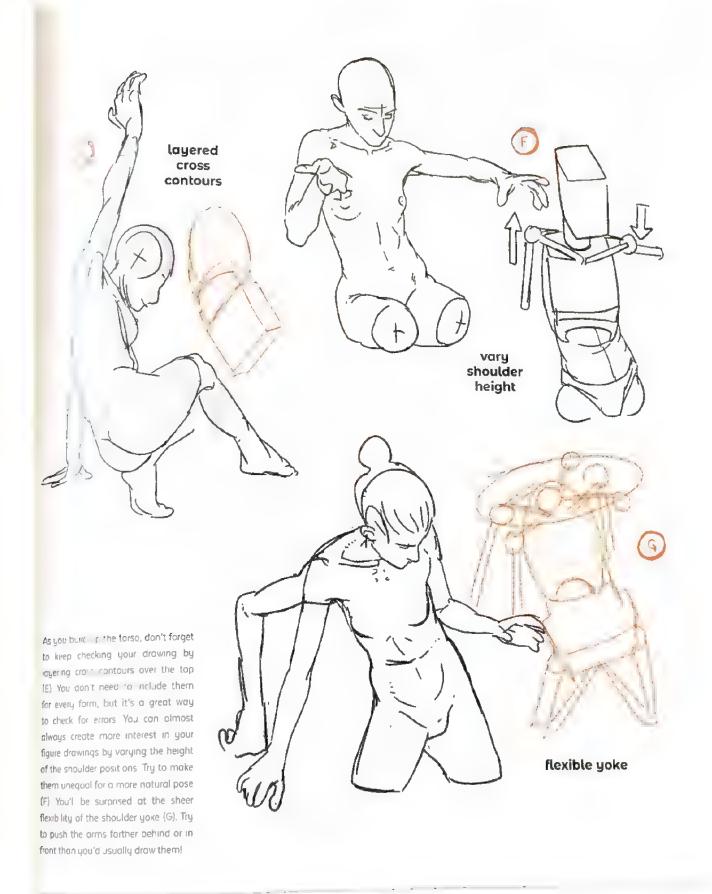
# building the yoke

Let's build the yoke area using simple geometry as a base (A). Add simple, scapula. Two thin cylinders will do for the clavicles, for now, with a ball at each end for the glenohumeral joint (shou der joint). Note that the clavicles aren't flat, but angled back and slightly upward in most poses (B)

Let's chop off the top inner and bottom outer corners of the scapulae cubes flattened cuboid forms for each to create a more winglike shape (C) From above, note how the yoke shape is almost a diamond. These parts are all linked, providing enormous strength and flexibility to the arms and shoulders through the muscle and tendon attachments (D).



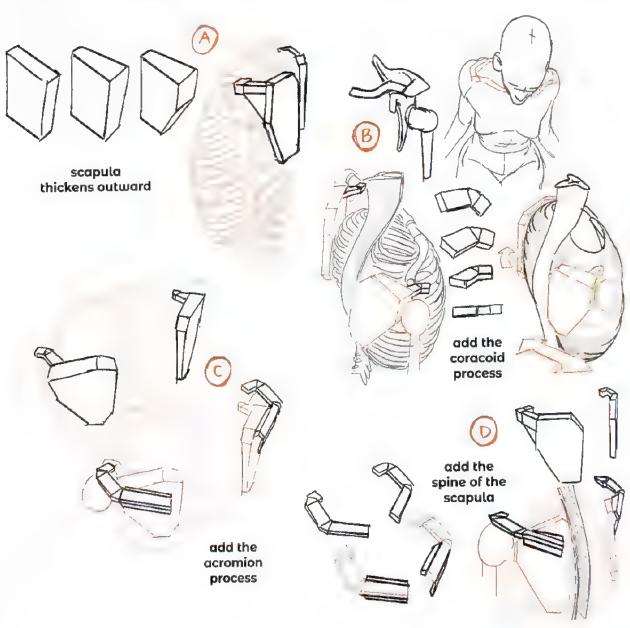


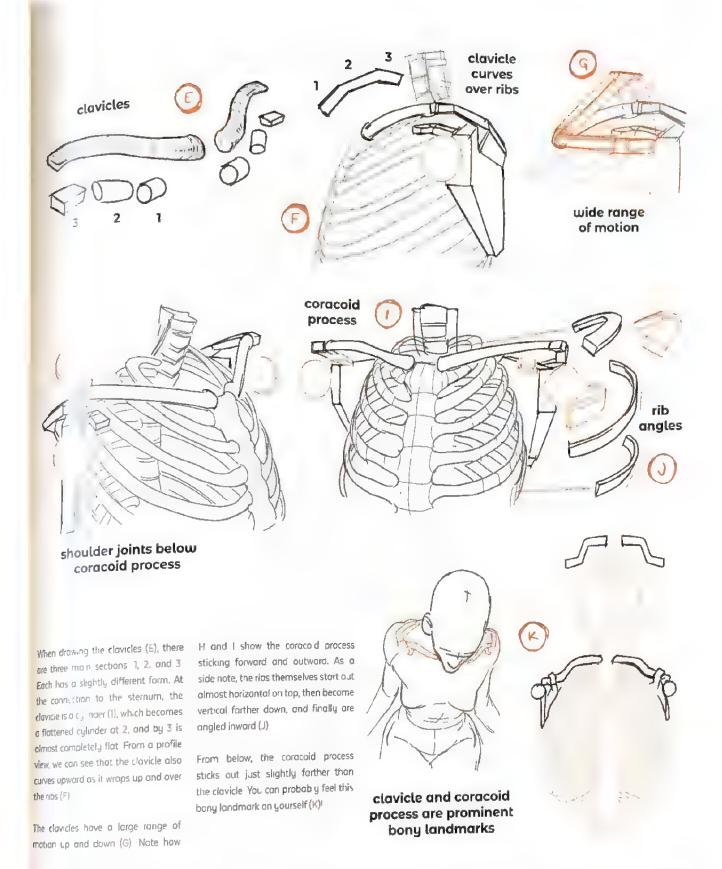


## refining the yoke area

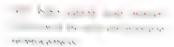
To refine our scapula shape, let's taper it from the outside in. It's thicker by the shoulder joint and becomes thinner near the spine (A). Next we add the coracoid process - basically a little process, which is shaped like a buffalo

finger at the front of the scapula, which points forward and outward, away from the center of the body (B) On top of this we add the acromion hom (C) It attaches to the flat section at the back of the scapula and wraps ground and forward. The end curls inward and is connect to the clavicle by a small, flexible joint (C) To this, we can add a couple of angled planes, just to connect it to the scopula more salidly (D). This whole shape forms the "spine of the scapula," the prominent ridge found on each shoulder blade



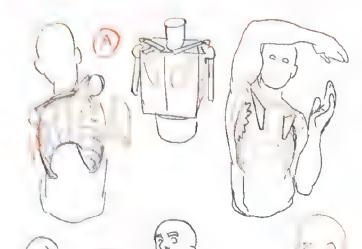


#### pectoralis minor & serratus anterior



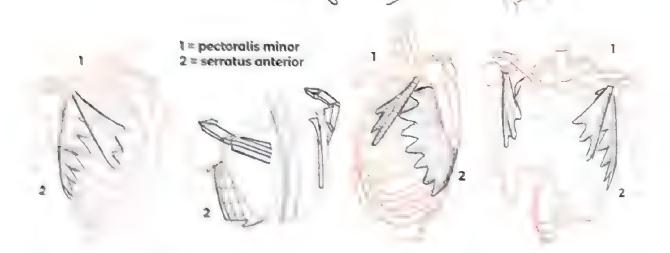
the ban excessions and a space of the same of the construction and the same of the construction of the con

and the second statement they are the



pectoralis minor is a triangle shape





## pectoralis major

totalisminor, we'll add

onto!

n musc es Major

the pector

greater - this muscle

there means "greater" - this muscle

there means "greater" - this muscle

to the exterior of the humerus

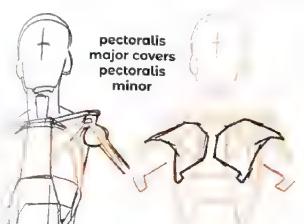
not to the exterior

outside of the humerus, meaning that it rotates the arms internally (toward the center of the body) (B)

The pectoralis major attaches in a rounded way to the sternum. It doesn't run straight down the middle (C). It also wraps around the rib cage, which is itself rounded. When viewed from a

three-quarter angle, we usually don't see much of it because it's wrapping around out of sight (D)

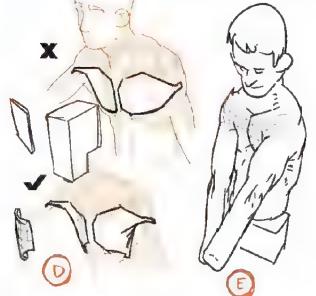
When the arms are brought together, the distinction between these "pecs" and deltoid muscles is lost and they become one mass (E). Don't try to separate them





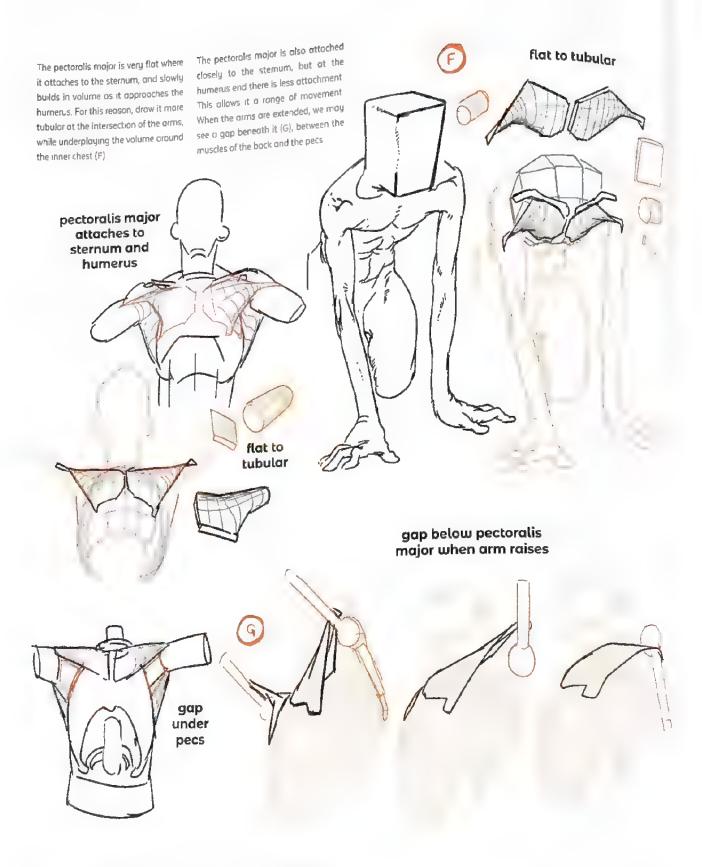


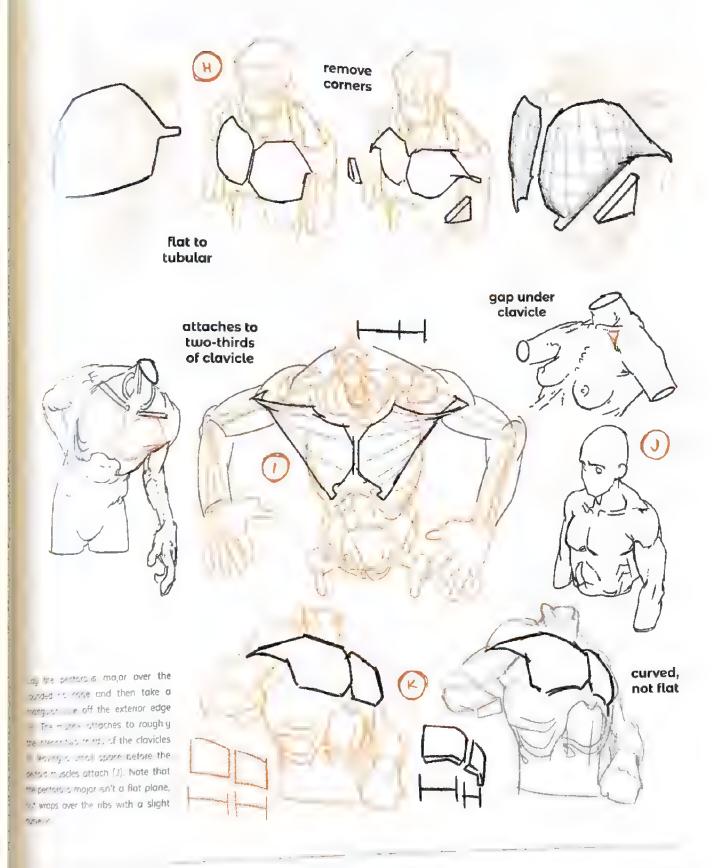
pectoralis major rotates arms inward



pectoralis major covers pectoralis minor

rounded shape that twists around arm pecs wraps around the rib cage pecs and deltoids squash together



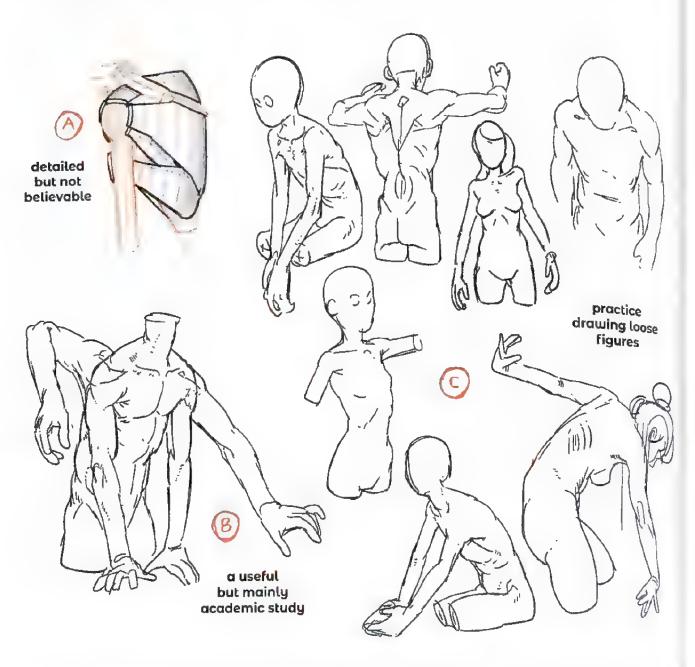


# tip: keep your distance

When drawing anatomy studies, try to study at all "distances." What does this mean? Well, we tend to begin anatomy drawing quite loosely, and get more detail-oriented the more we study When looking at a drawing like A, you will tend to lose sight of the big picture. Like in the saying, "You can't see the wood for the trees," you aren't drawing a figure any more, but a collection of

musc es! B is another example of this.
It's believable as a form, but it doesn't
look like a real person. Our goal is
to acquire the skills needed to draw
a relatively realistic person! A good

way to practice is to learn to arc.
the muscles themselves, but the property to also draw some posse
figures where you aren't detailing the individual muscles (C).



## pular muscles

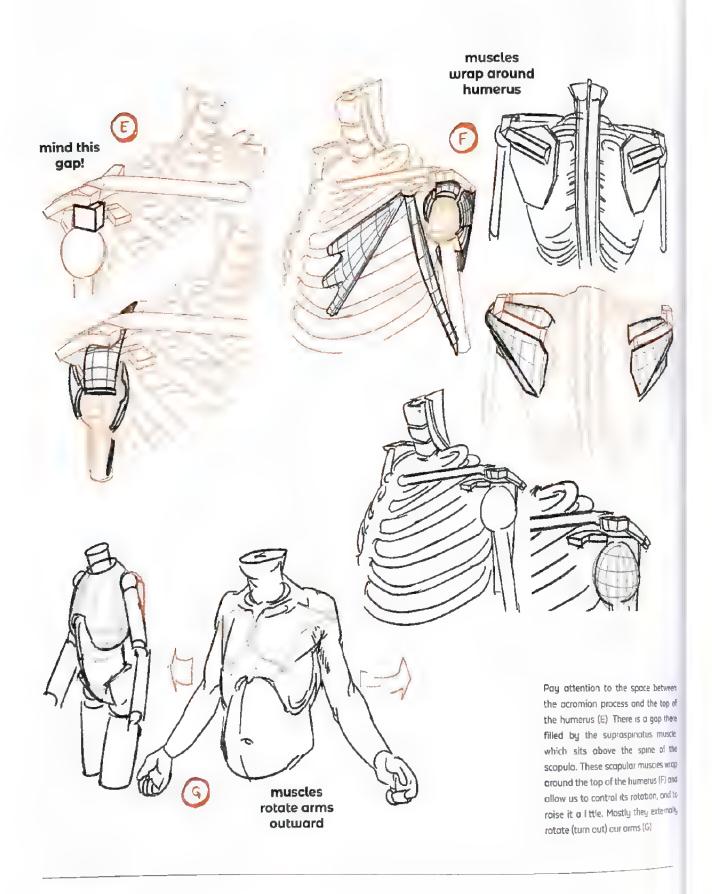
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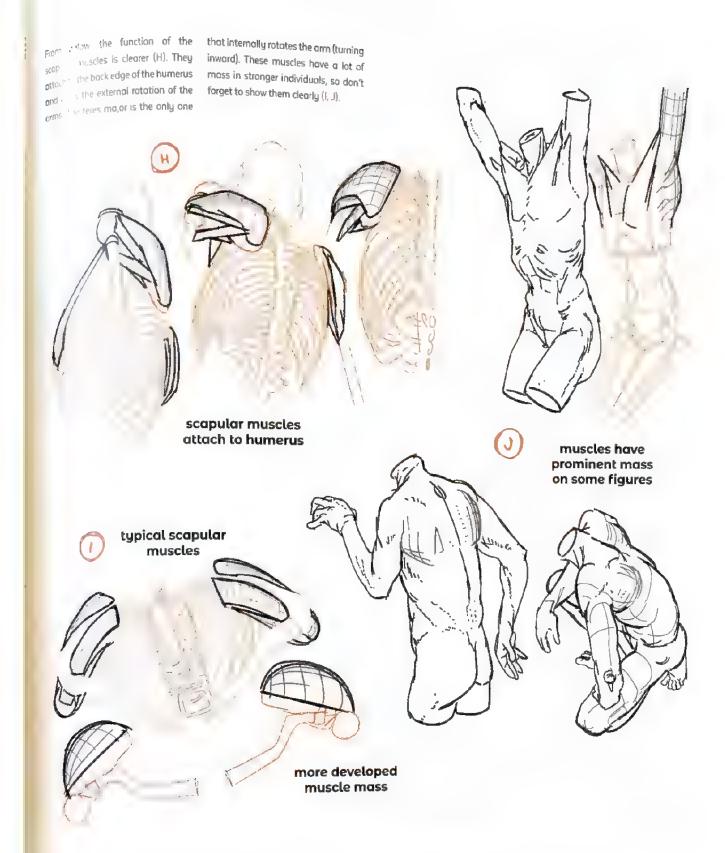
n muscles of the roles (A). These he shoulders and e in resisting the ne pectora is major and latissimus dorsi muscles (B). The scapular muscles are powerful, and without them, our shoulders would be strongly rounded inword (C) In D

is the supraspinatus (supra meaning "above" and spinatus meaning "spine"). Muscle 2 is the infraspinatus (infra meaning "below"), Muscles 3 and we can see them numbered. Muscle 1 4 are the teres minor and teres major,

respectively. The most important thing to note here is that the teres major, the bottom muscle, attaches to the interior of the humerus. The rest attach externally or on top





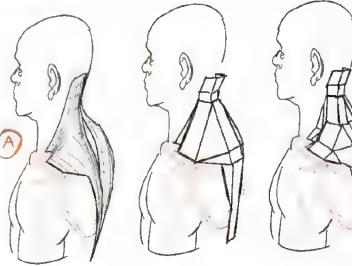


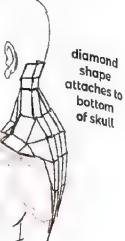
trapezius

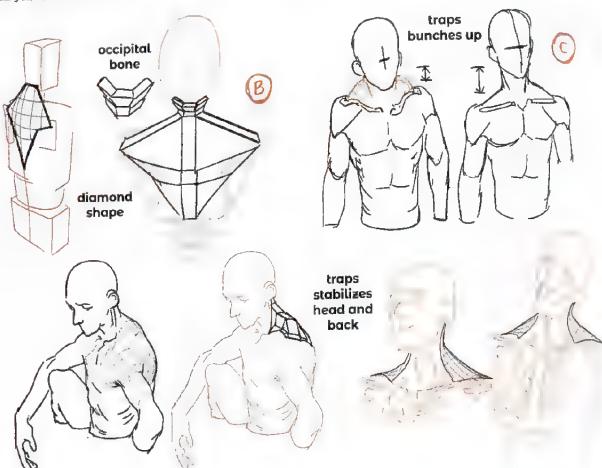
The trapezius muscle connects the bottom of the sku i to the back and scapulae. Its diamond shape provides great stability to the back by connecting the head to the yoke and spine (A).

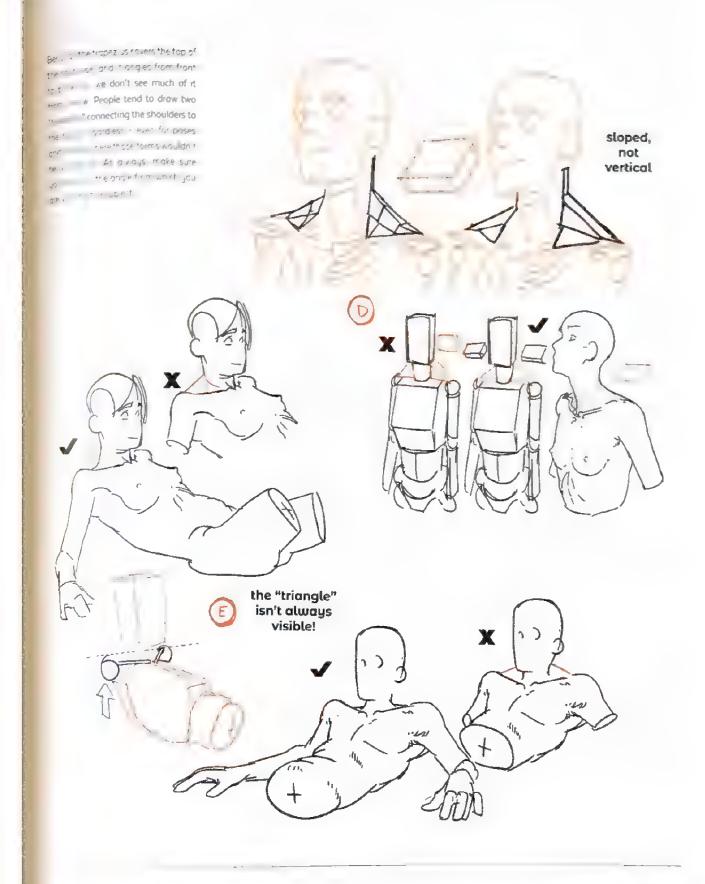
Note the strong curvature of the attachment to the head (B). There are three planes on the back of the trapezius where it attaches to the head - it's not a vertical line

When the shoulders are roised, the trapezus (or "trops") bunches up, creating the illusion of more moss (C)



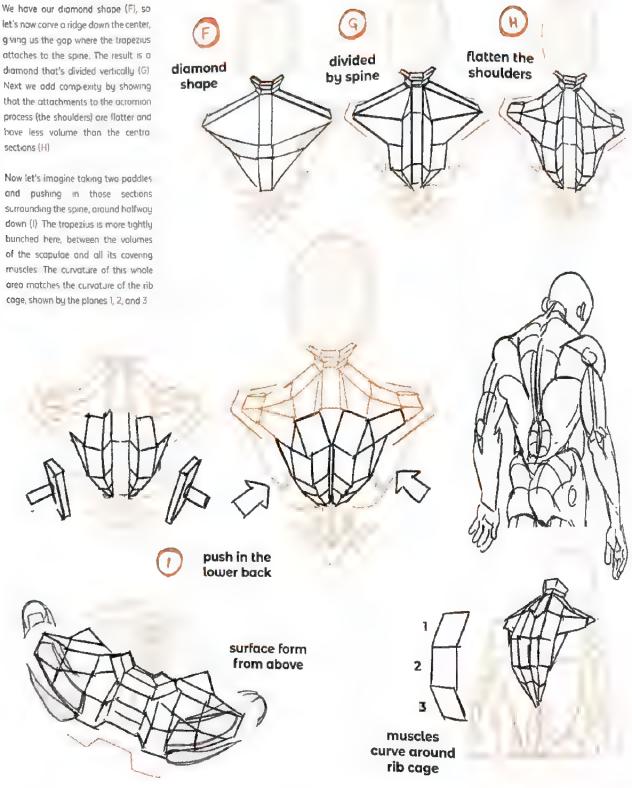




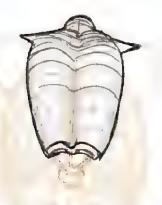


let's now corve a ridge down the center, giving us the gap where the trapezius attaches to the spine. The result is a dramond that's divided vertically (G) Next we add complexity by showing that the attachments to the acromion process (the shoulders) are flatter and have less volume than the centra sections (H)

and pushing in those sections surrounding the spine, around halfway down (I) The trapezius is more tightly bunched here, between the volumes of the scapulae and all its covering muscles. The curvature of this whole area matches the curvature of the rib









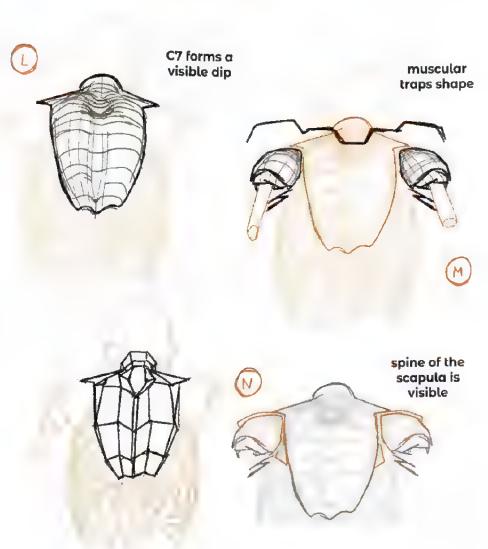
spine forms a groove in the muscle

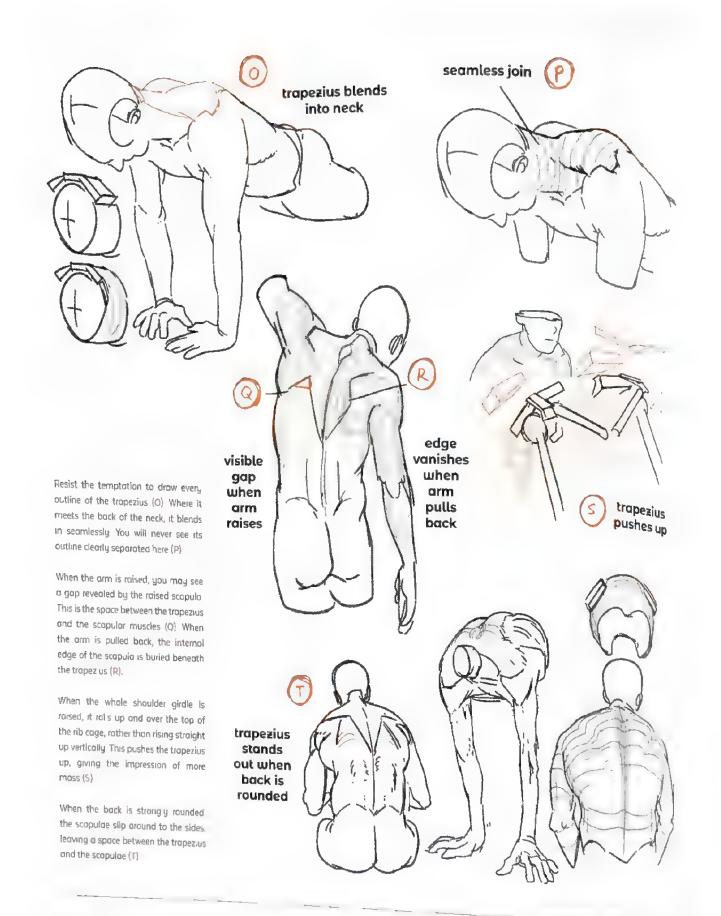
#### spine sits below the trapezius

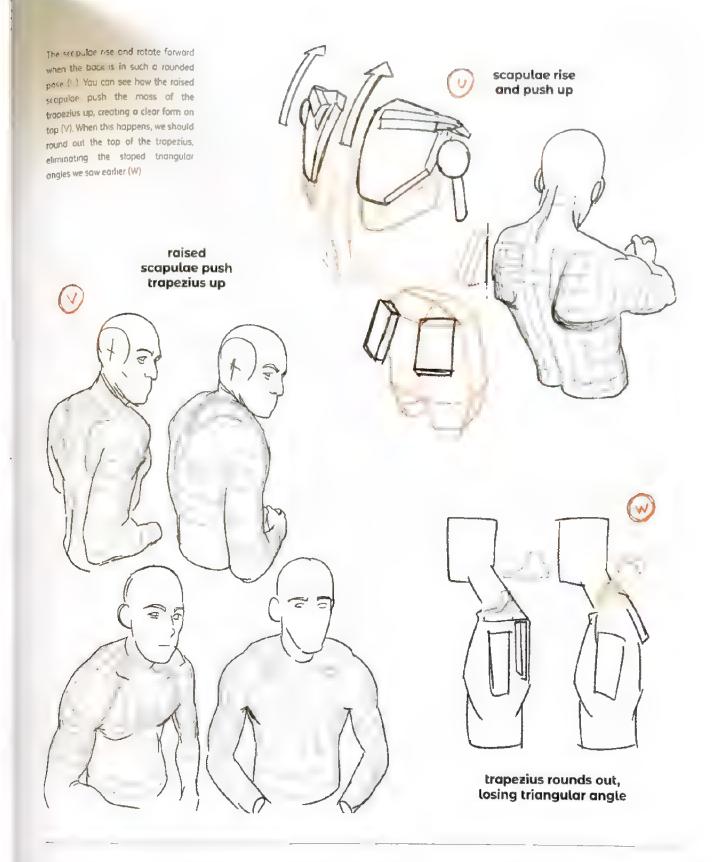
When s i fung the trapezius, remember that the spine is a wedge occupy in the space between the ribs at the back. We know from page 133 that the spine also has three ridges. When we loy the trapezius over it the largest central ridge ends up as a groove due to the thick muscles covering it (K). This happens often throughout the body – bony projections become dips in the layers of muscle.

In L, you can see a depression in the thickness of the trapezius. This occurs around the seventh cervical vertebrae of "C7". The C7 is the largest vertebra at the bottom of the neck but all you really need to know is that it's just above the scapulae!

In M we see the cross-section of the bock when at rest in a muscular individual. More athletic people tend to have more developed scapular muscles, which can become very prominent. Note the double step down toward the spine. We will also usually see the spine of the scapula (N), as it has no muscle directly covering it.





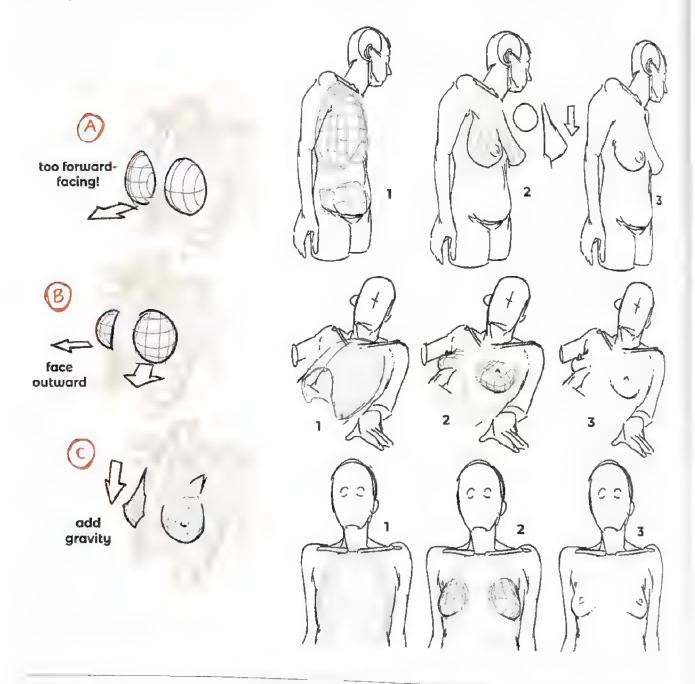


## drawing breasts

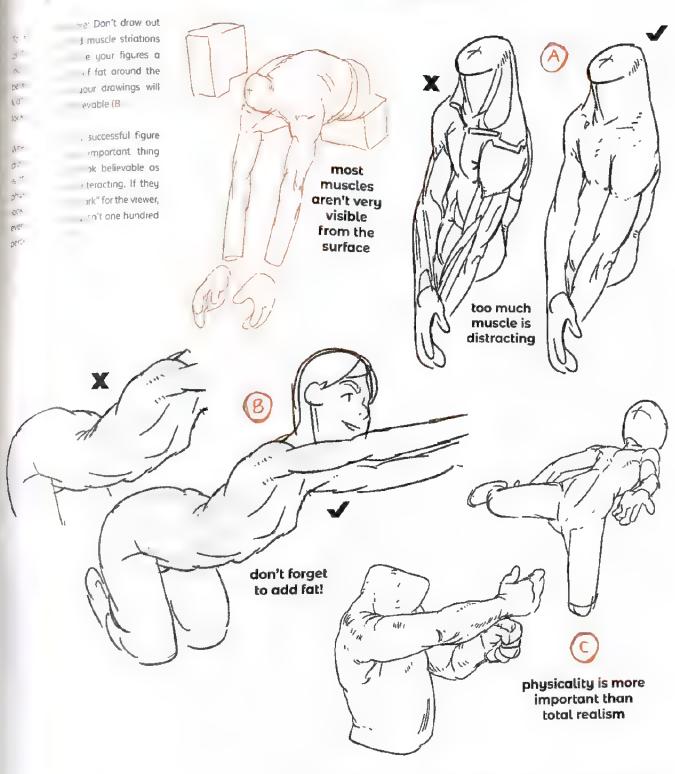
When drawing breasts, clearly visualize the rib cage's shape beneath Avoid drawing "car headlight" breasts that both foce directly forward (A) The rib cage is rounded, so we should

instead aim to separate the breasts out, making them point away from the sternum (B) Next, apply the weight of gravity to pull their forms downward (C) The greater the mass of the breasts, the more obviously they will be offected by grovity. As they are such rounded forms, we will usually see very little in terms of edges, so just like when drawing the jaw, less is always more. In

steps 7 to 3, we first draw the rib cage and body, then add cross contours (taking gravity into consideration) Finally, we erase the cross contours so we are left with minimal lines

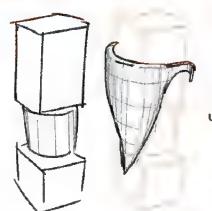


## tip: fat & muscle

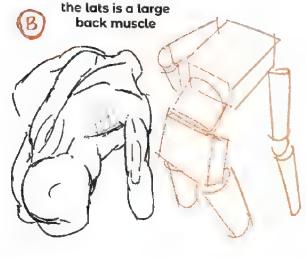


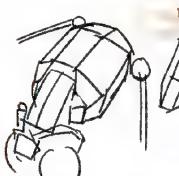
## latissimus dorsi

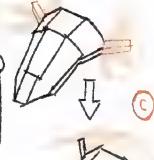
The latissimus dorsi (the "lats") is a - to the arms. These ends are highly large back muscle that attaches to the flexible and elastic (C, D) interior of the humerus, about a third of the distance from the top, it runs. The latissimus dorst lies over the down the back and into the top of the bottom section of the scapulae (E) pelvis (A, B). It attaches to the spine On some people - but not all - it is centrally. The two loose ends attach— attached to the scapulae, too

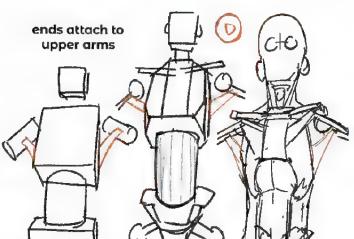


latissimus dorsi ("lats") wraps around the back



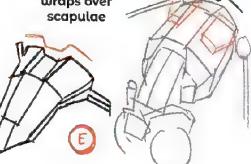


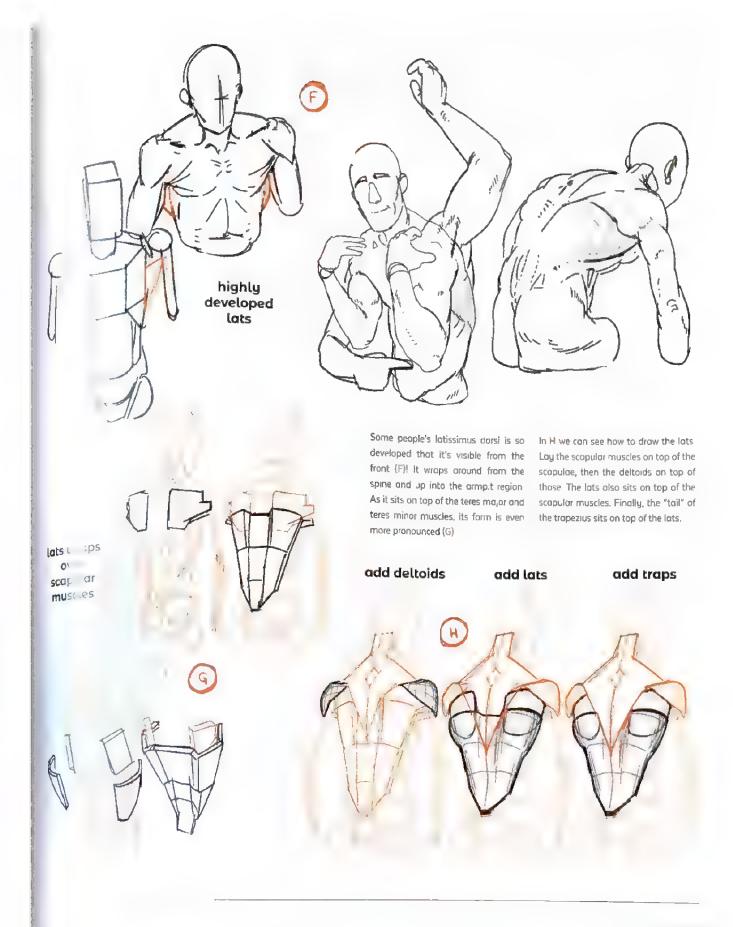






ends attach to upper arms

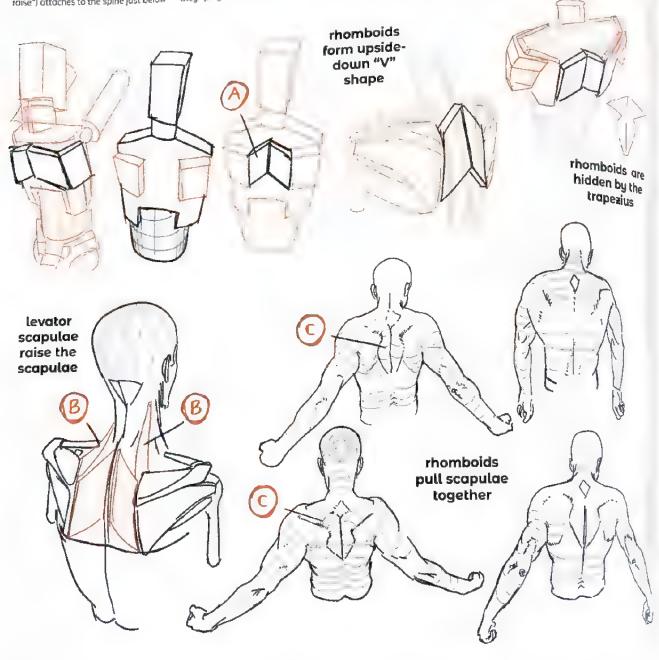




## rhomboids

The rhomboid muscles form an upside-down V in the middle of the back and connect the spine to the internal edges of the scapulae (A). The levator scapulae (levator meaning "to raise") attaches to the spine just below

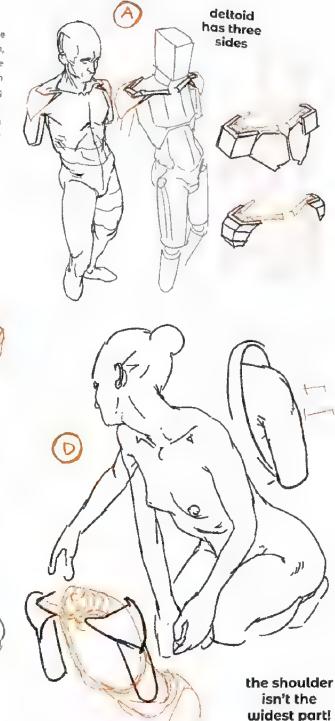
the skull and raises the scapulae (B) Both these muscle groups are rarely seen because they're covered by the trapez us, but it's important to know that they're there because of the roles they play. The rhamboids pull our scapulae tagether. When we retract (pull back) our arms, the trapezius bulges (C), giving the impression that it's doing the pulling. It's doing some of the work, but most of the power actually comes from the rhomboids!



## deltoids

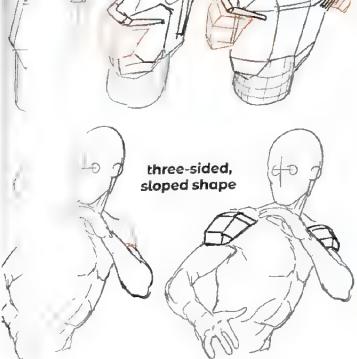
The aeltoid muscle forms the biggest moss of the shoulder When simplified, it has three sides from front to back (A). These are angled, sloping down from front to back, they are attached to front to back, they are attached to the acromion process on the scapula, the acromion process on the scapula, which is also angled backward (B). Which is a sioped, coplike shape that wraps around our shoulder (C).

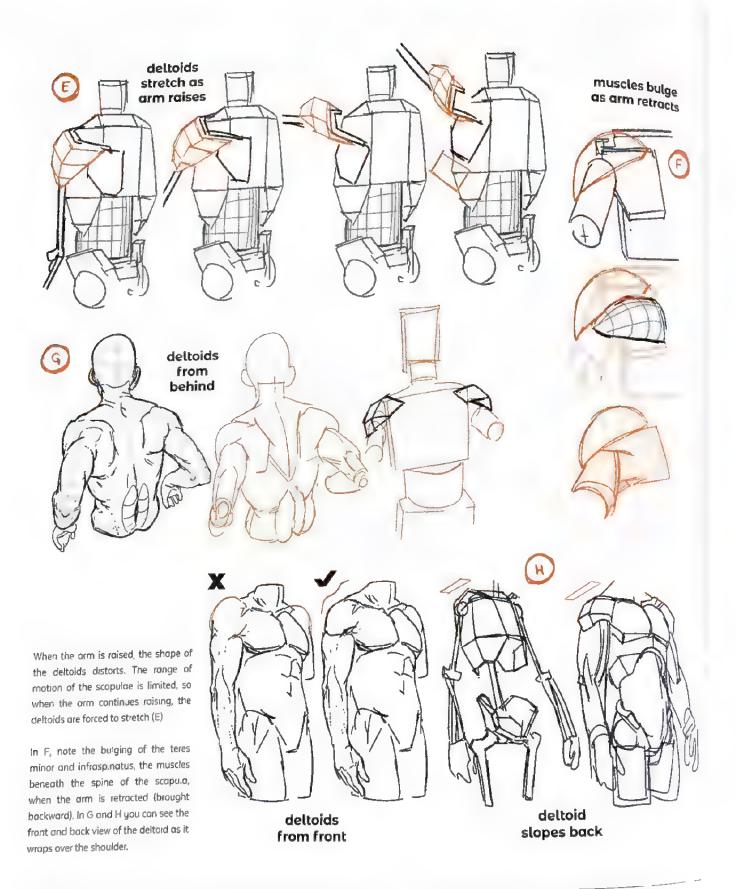
A common mistake is making the shoulders the widest part of the arm, but they naturally look more like D. Here, the scapular muscles push against the mass of the arm, causing a bulge that's wider than the shoulder This is very common in people with less-developed shoulder muscles or more-developed backs.





#### deltoid slopes down and back

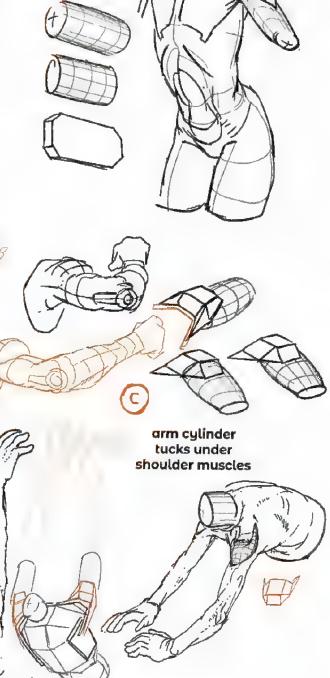




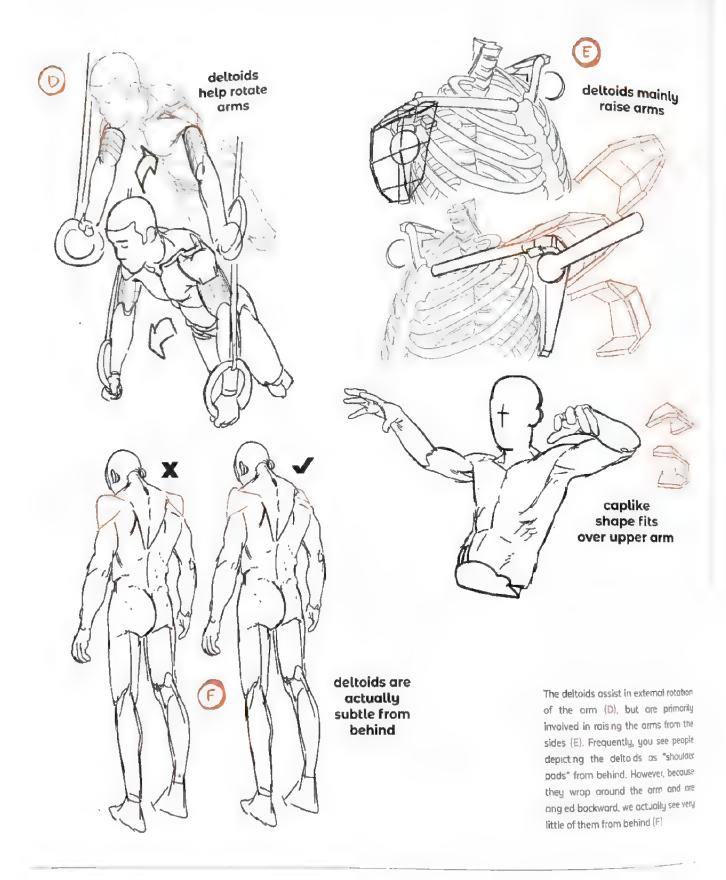
# joining the torso & arm

We'll move on to the upper arm shortly, but for naw let's just magine that the but for nam itself is a flattened cylinder upper arm itself is a great tool for us, as it (A). This shape is a great tool for us, as it dlows us to explore the arm's rotation dlows us to explore the arm's rotation after clearly. The deltoid attaches to note clearly. The deltoid attaches to the outer third of the clavicle, and then

visible groove between muscles there's a gap between its attachment and that of the pectoralis major. We often see a small groove or triangle in this space (B). The muscles of the shoulder form a cap-like shape over the upper arm (C).



squashed cylinder arm shape



points of the deltoid e points disappear then the arms raise ie of the pectoralis t point. As the arms move down, which I the trapez us

me

63

W.C.

11

del

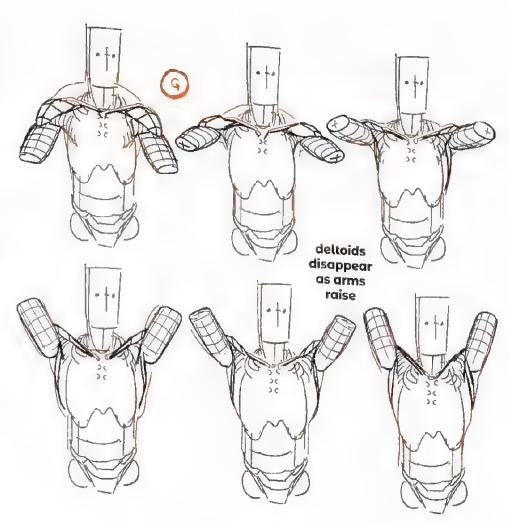
basic

crude

subtle

i, muscles, and eem like a lot to th practice you becoming more easing levels of ings as having basic, crude, and

ave done what's
whe the basic
e form in the
ve included some
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ife Ask yourself,
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basic figure figure

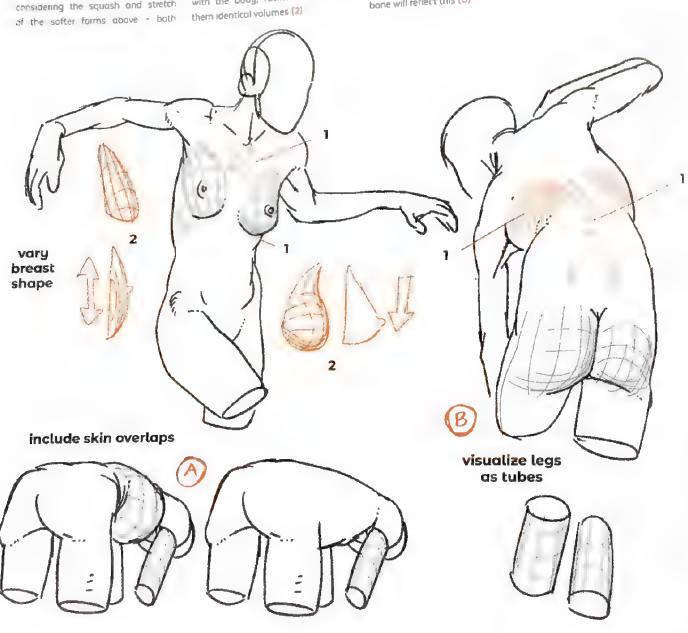
## tip: soft & solid forms

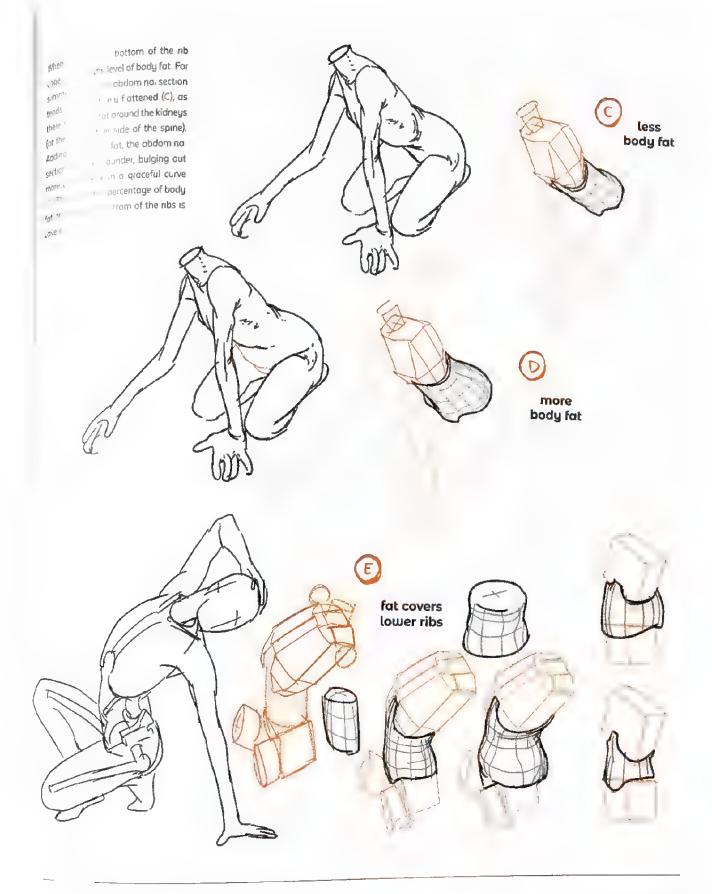
On slimmer models, bones are visible in certain regions where the muscle volume is thin. To draw this kind of figure, you can try showing the ribs in the areas marked with 1 Be aware of the solid forms beneath while also considering the squash and stretch of the softer forms above a both

tupes of form are essential to make a be-levable-looking figure

Breasts exemplify this Include variety in all aspects of figure drawing, such as differently shaped breasts that move with the body, rather than making them identical volumes (2)

Viewing the rib cage from below or behind, we still need to indicate its rounded shape. Overlapping folds of skin is the easiest way to achieve this (A). Visualize the legs as tubes; if one is pointing away from us and the other toward us, the soft forms above the bone will reflect this (B)

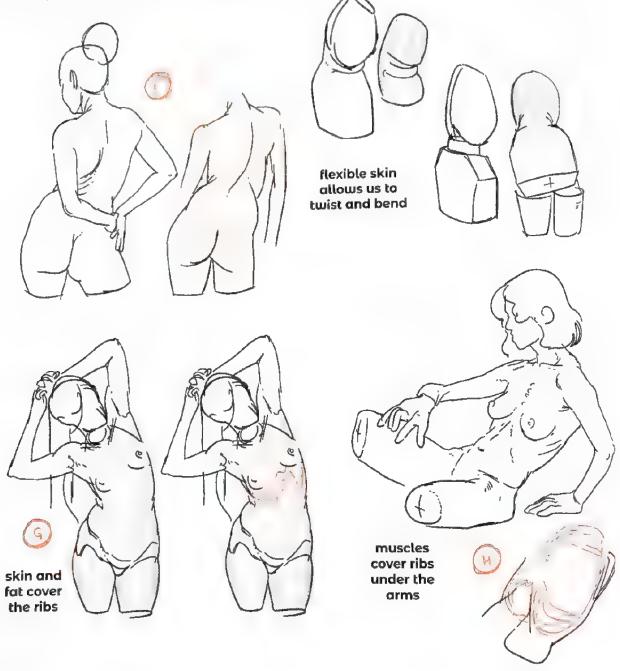




Even if you can visualize the rib cage twist and stretch, we have looser skin-

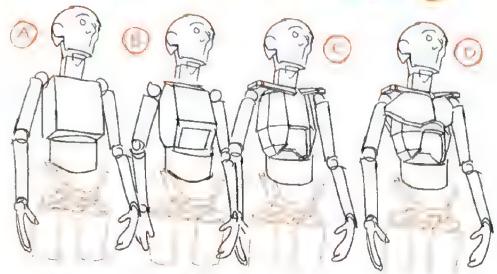
located around the sides and bottom accurately, t's better not to draw it of the rib cage. This case skin allows explicitly t's more believable to imply us greater flexibility (F). Use these folds the volume, as we see in everyday life to help describe the bend and stretch Because our torsos are required to in your poses (G). On slimmer people, we often see the ribs at the sides, but

you will almost never see them under the arm area (H), where the muscles of the scapula and back wrap around to cover them



### upper torso summary

Let sreview the level-of-detail changes to the upper torso so far, and recap the key areas and muscles we've rearned. We began with a simple box with spheres for the shoulder joints and cylinders for the arms (A). We then established the rib cage's major planes, angling them out and then back inward (B). We added the yake of the clavicle and scapulae to create anchors for the arms to pull against to the inner two-thirds of the clavicle (D).

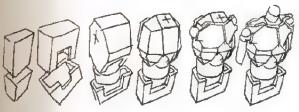


simple box and joints

major planes

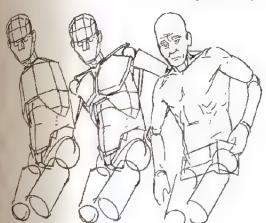
shoulder yoke

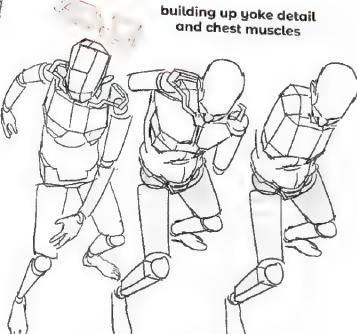
pectoralis muscles

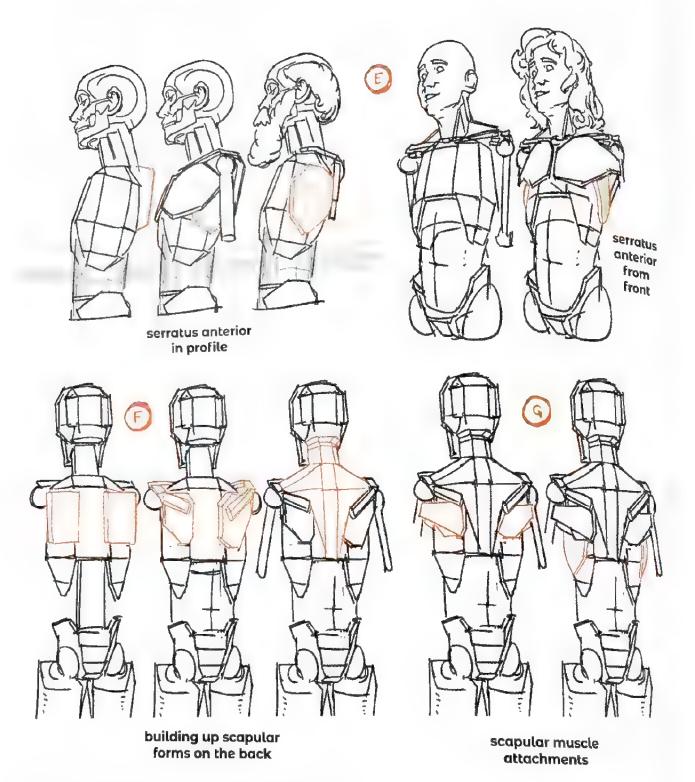


low detail

high detail

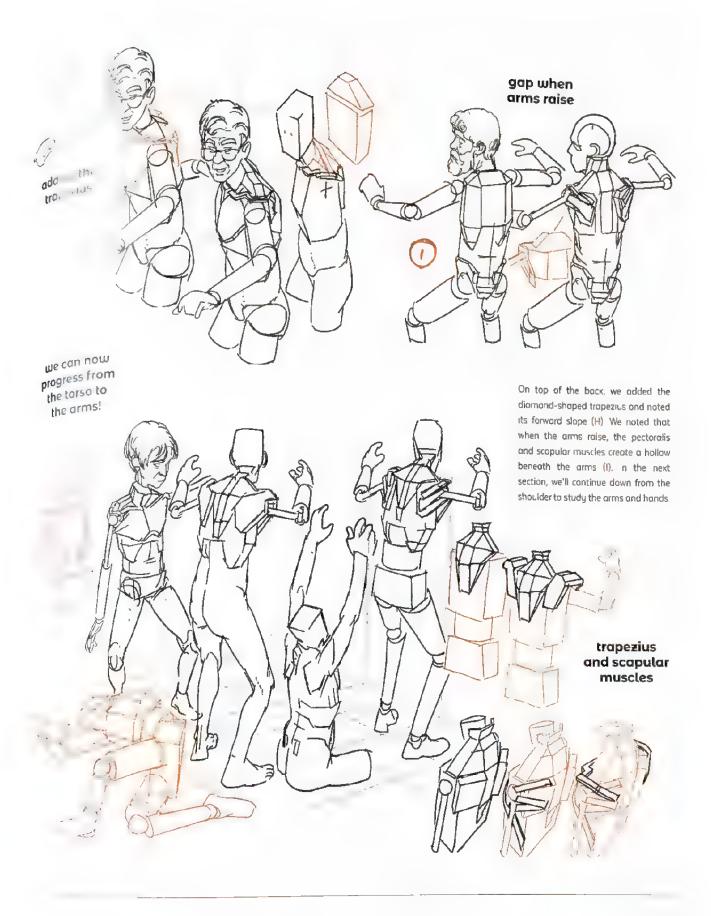






Next, we added the mass of the serratus anterior muscle to the sides of our rib cage form (E). We added the forms of the scapulae to the rear (F).

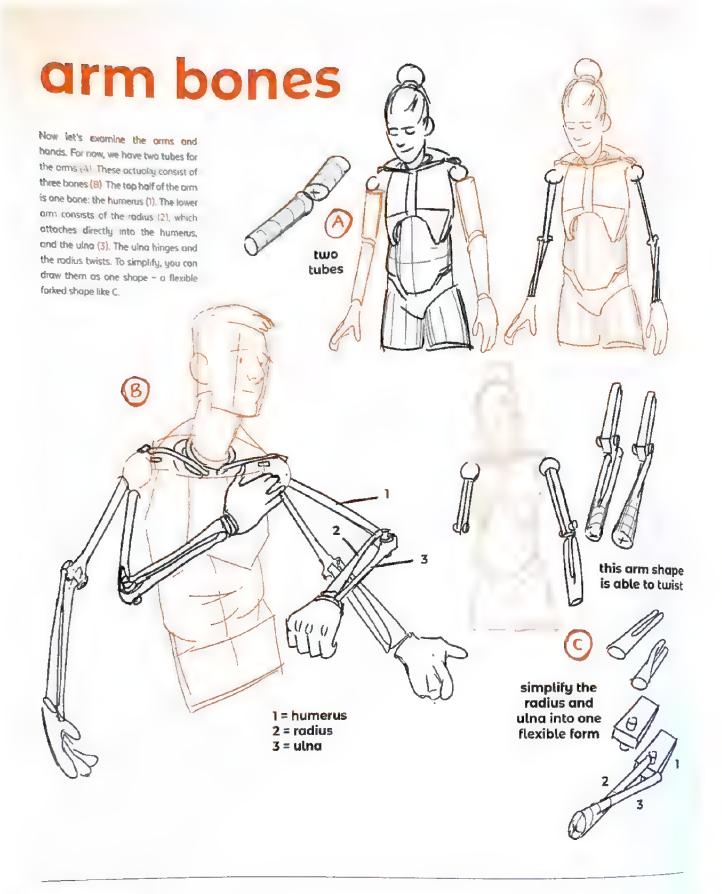
We covered various levels of detail for the scapulae and saw how the muscles attached to them and wrapped around the head of the humerus (G).

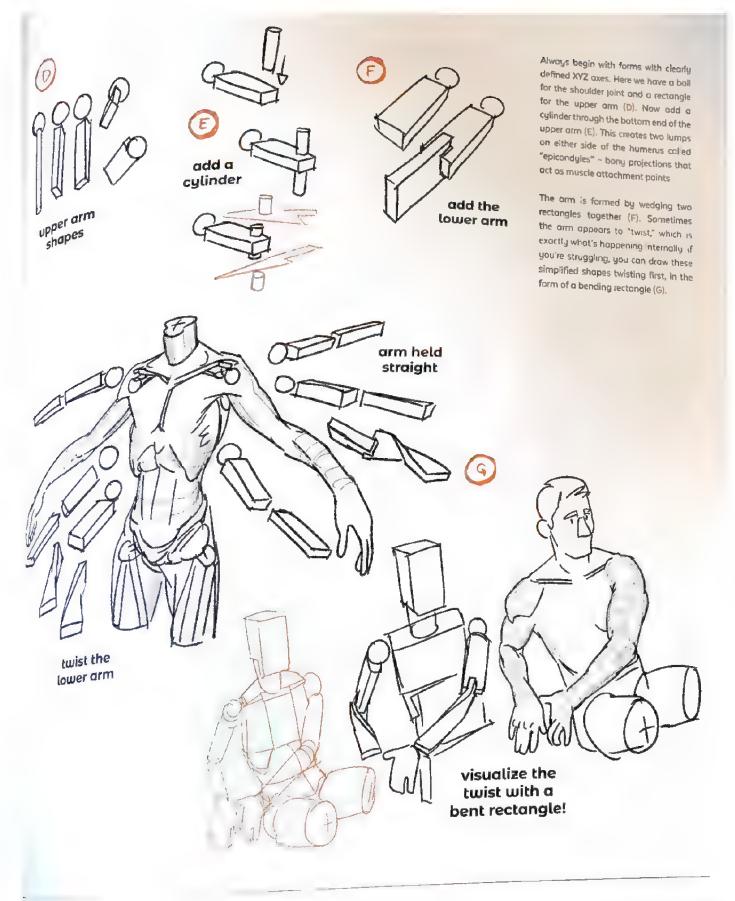




# lesson 3: CITMS & Indinds

everyady actions! Luckily, like everything else parts for study



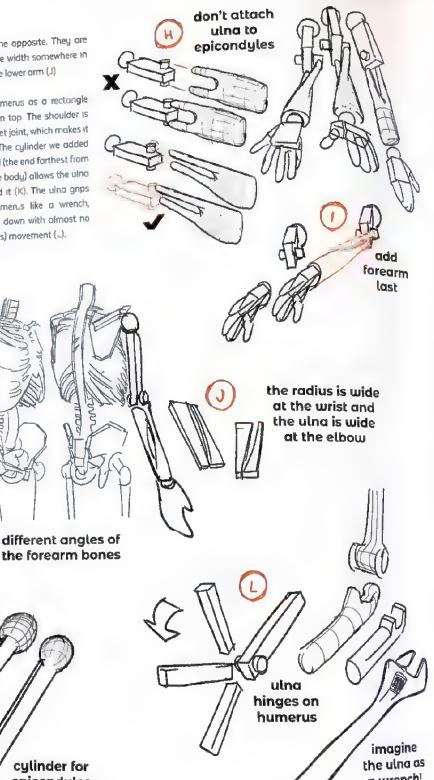


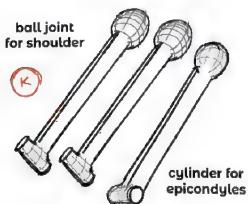
The radius attaches to the lateral (meaning "outer") epicondyle. The ulno doesn't attach to the medial (meaning "inner") epicondyle. This is important to remember (H).

If you're struggling to draw the twist, try drawing from "point to point." Draw the end of the humerus first, then block in the hand, and then fill in the gaps. This technique makes it easier to visualize the intermediate forms (i). The radius is narrow at the epicondyle and widens toward the hand, while

the ulna does the opposite. They are around the same width somewhere in the middle of the lower arm (J)

Imagine the humerus as a rectangle with a sphere on top. The shoulder is a ball-and-socket joint, which makes it highly flexible. The cylinder we added at the distal end (the end farthest from the center of the body) allows the ulna to hinge around it (K). The ulna grips around the humerus like a wrench, hinging up and down with almost no lateral (sideways) movement (..).





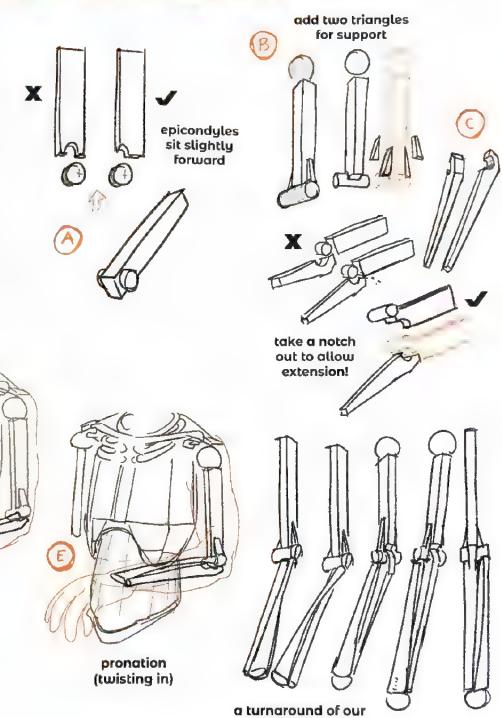


## moving the arm

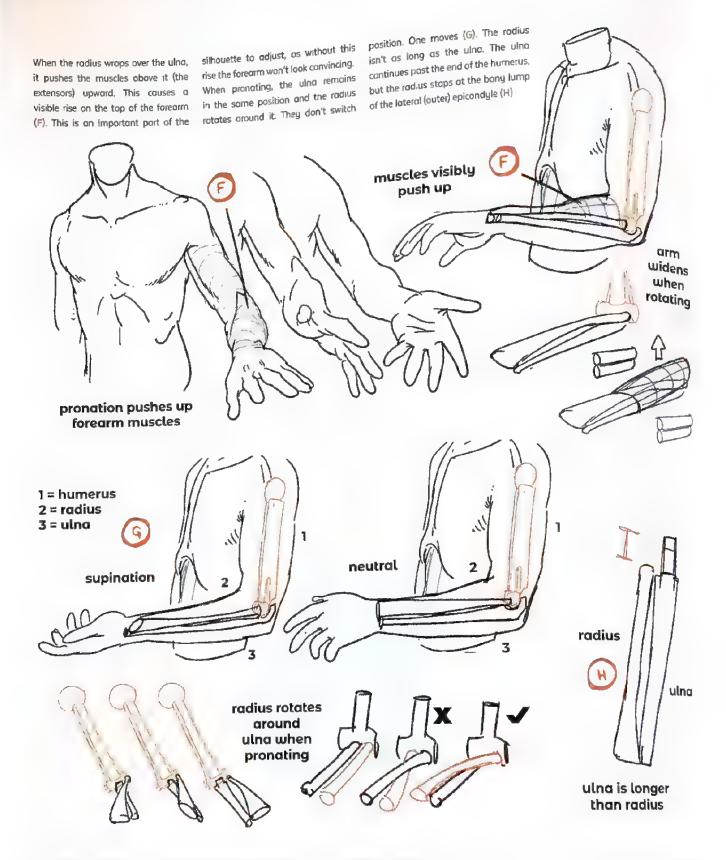
When odding the cylinder (for the epicondyles) to the end of the humerus, note that it doesn't attach right in the middle of the block, but forward of the center (A). Add two triangular supports on either side of the cylinder to strengthen it (B). Take a notch from the back of the humerus to allow the wrenchlike shape to fully straighten (C) without this notch, the arm wouldn't be able to fully extend!

when the hand is turned outward (palm up), it's called "supination" (D) When turned inward (palm down), it's "pronation" (E). When pronated, the radius wraps up and over the uina. The radius always ends on the thumb side of the wrist, while the uina always ends on the little finger side

supination (twisting out)



basic arm so far



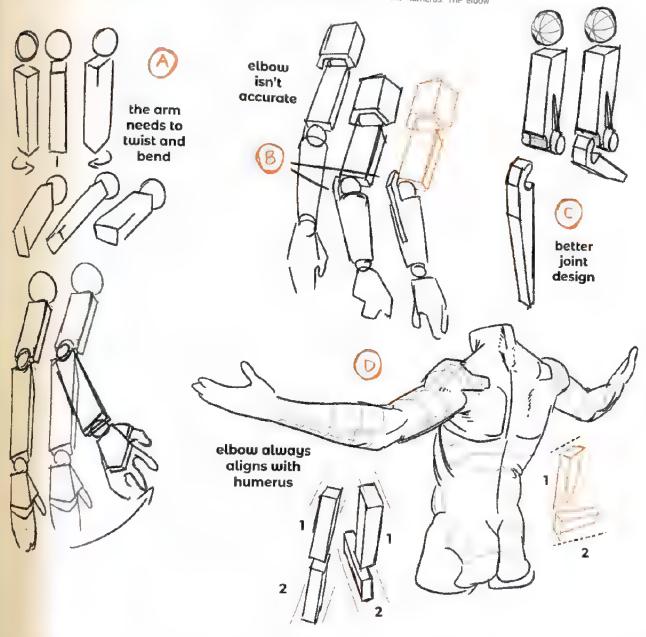
## designing the arm

pesign basic forms to emulate the shapes of the bones and muscles, creating a shorthand version of the orm to use. This will improve your naterstanding of the arm. Ask yourself what functions the parts need to perform The whole arm must be able

to rotate within the shoulder socket, as well as bending at the elbow (A)

B looks like a good potential design for the arm, but there's something wrong with it – it doesn't reflect the arm movements we need. The tip of the e'bow (the olecranon process, which is the end of the uina) doesn't rotate around a ball like this

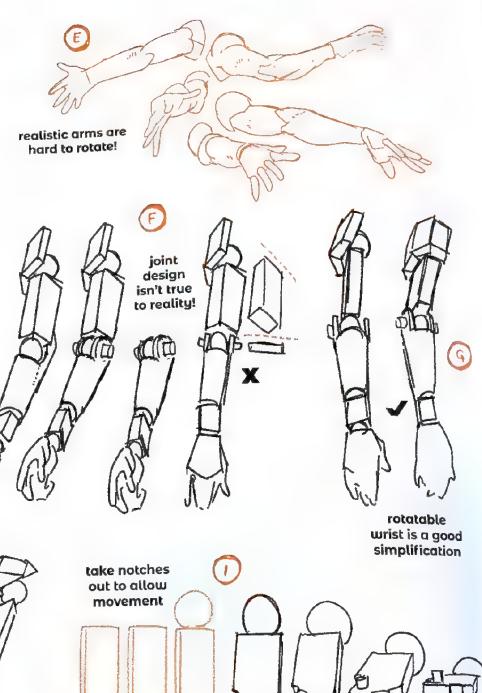
C is a better design for the arm. The ulna fits into the notch we made at the back of the humerus. The elbow always faces in the same direct on as the upper arm, so parts 1 and 2 must always be aligned (D)

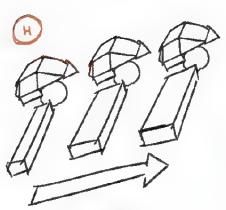


The arms in E are relatively accurate, but they're difficult to rotate from imagination because of the lack of clear edges, planes, and corners

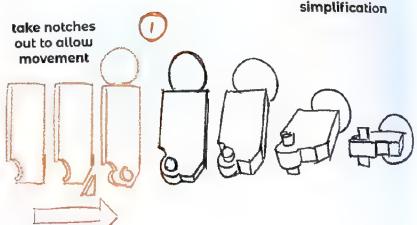
The design in F fails our function test because the epicondyles are attached to the lower arm. The epicandyles are part of the humerus, the upper arm, so they wouldn't rotate like this. What does work well about this design is that the wrist can rotate (G). This is a good addition to take forward.

This leads us to the functional shape that I personally favor. To create this base for the whole upper arm, we elongate the flattened rectangle of the humerus (H) take a round notch out of the back, snip the corner off the front, and attach the epicondyles directly to rt (I). The pieces we remove allow the ulna to attach and have a range of movement





widen the rectangle

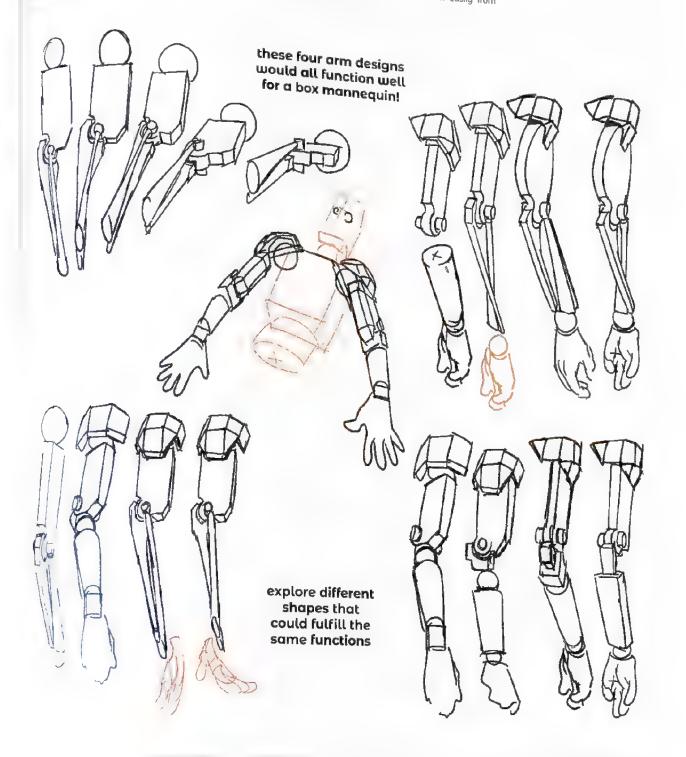


Tig to design your ewn forms for the The understanding comes for your own investigation and the standard of the stronght

process more than suggesting you use exactly these models: Experiment with different simple forms cylinders,

you use, the design should always be informed by function Constantly rectangles, or triangles, Whotever supinate, and be drawn easily from check that your parts can pronote,

different angles If your design is too complex, it defeats the purpose of making a box mannequin!

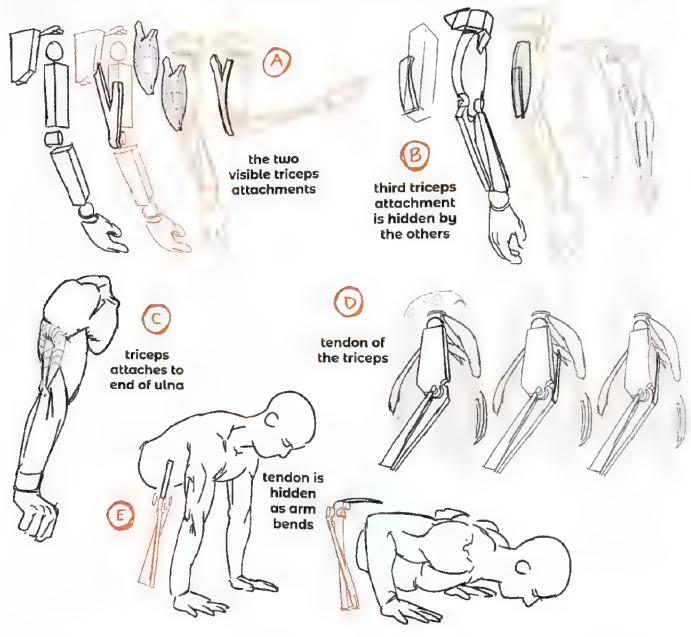


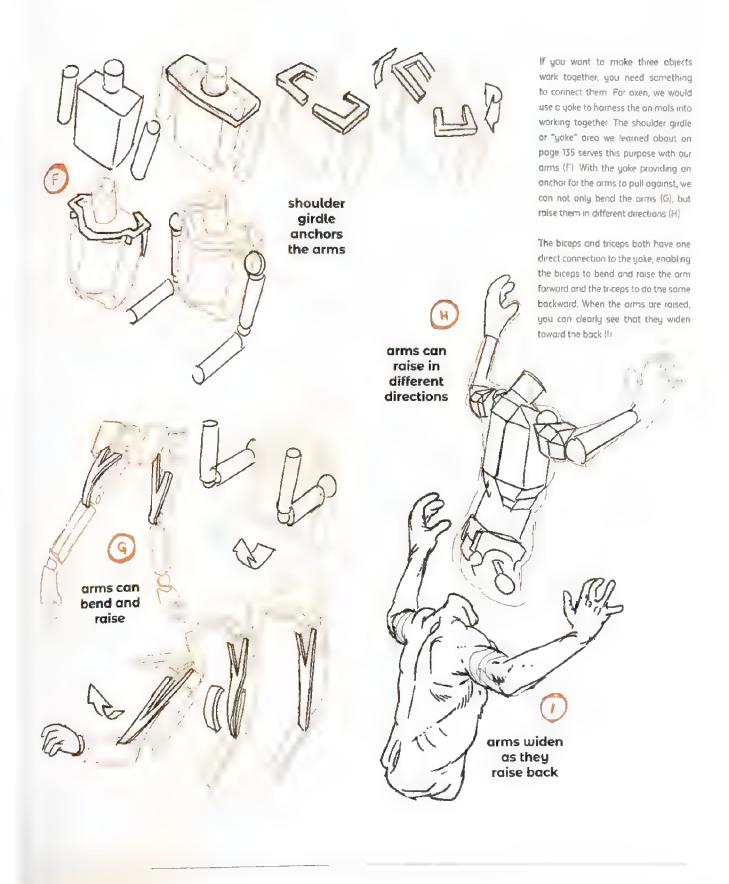
## triceps

There are two major muscle groups in the upper arm: the triceps that straighten the arm (extension) and the biceps and brachialis that bend it (flexion). Let's start with the triceps at the back of the upper arm. "Tri" means

"three" and "ceps" means "head" The "head" of a muscle is its origin point, where the muscle attaches to a fixed point, like an anchor. From this anchor, the muscle usually pulls and moves another bone. So the triceps muscle

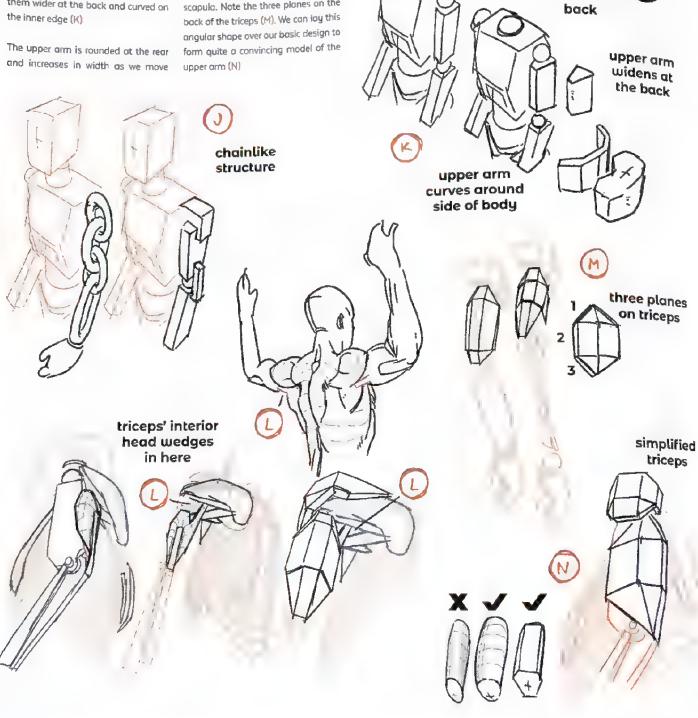
has three heads: one attached to the back of the humerus, one to the lateral (outer) edge of the scapula (A), and the third buried under the other two (B). The triceps attaches into the end of the ulna (the olecranon process) (C) The flattened section at the back is the triceps tendon (D). It's often drawn flat, but it bulges out because it lies on top of the third head of the triceps. The more we bend the arm, the less visible the triceps tendon will be (E).





The arm is often represented as a chain, which is a good way to visualize the wedging of the forms (J). The side of the rib cage isn't flat, but topers backward and is rounded. This has an effect on the forms of the arm, making them wider at the back and curved on the inner edge (K)

higher and approach the connection to the scapula and chest. The intenor nead of the triceps wedges into the scapula and chest (L). It doesn't just extend your arm, but also assists in pulling the whole arm back toward the scapula. Note the three planes on the back of the triceps (M). We can lay this angular shape over our basic design to form quite a convincing model of the upper arm (N)



front

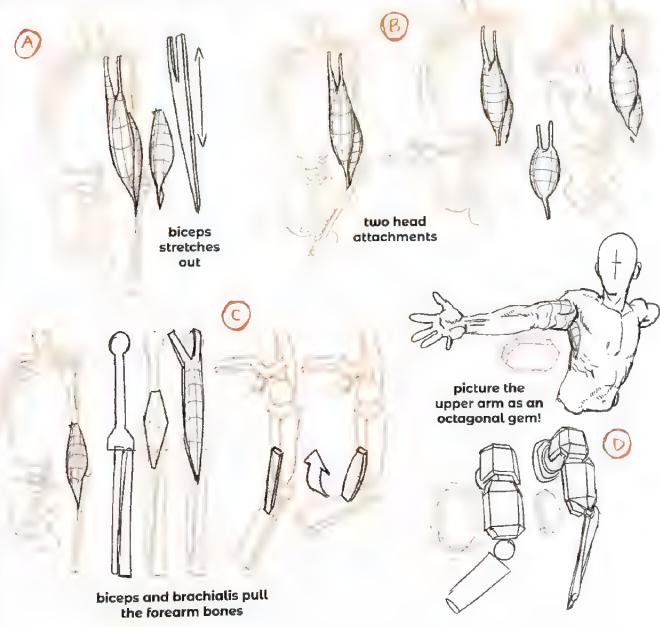
## biceps & brachialis

When stretched, the biceps ("bi" meaning "two") becomes thinner, as with all muscles. It has the same volume, but stretched over a larger area so it appears smaller (A). One head attaches to the coracoid process

on the scapula and the other wraps up and over the top of the humerus (B

The biceps inserts into the radius, not the ulno. The brachialis muscle (meaning "relating to the arm") sits

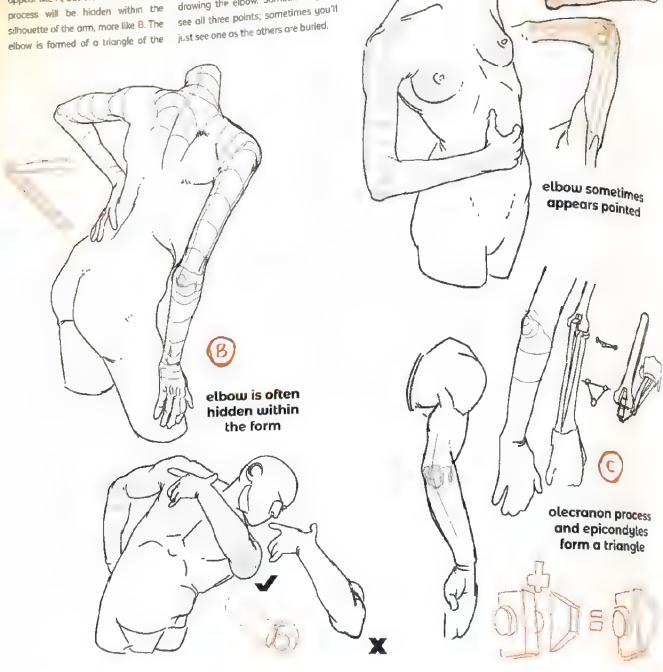
beneath it and attaches to the Jino So we have two large upper-arm muscles that each pulls on one of the two lower arm bones (C). All these muscles may seem complex in form, but I prefer to simply think of the upper arm as having an actagonal gem shape (D)

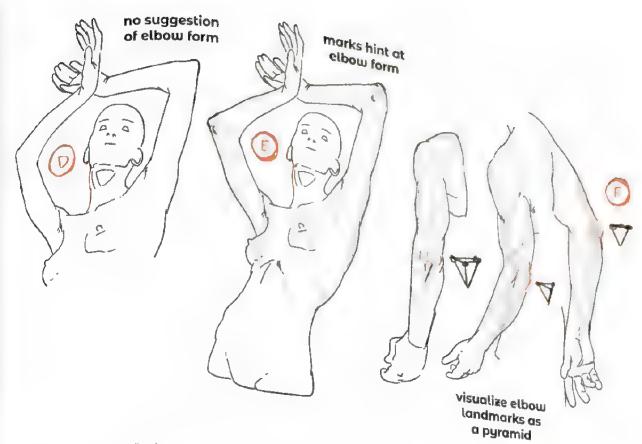


# the elbow

As we associate the elbow with the end of the uina, we tend to exaggerate its point. Sometimes the elbow does appear like A, but often the olecranon process will be hidden within the silhouette of the arm, more like B. The elbow is formed of a triangle of the

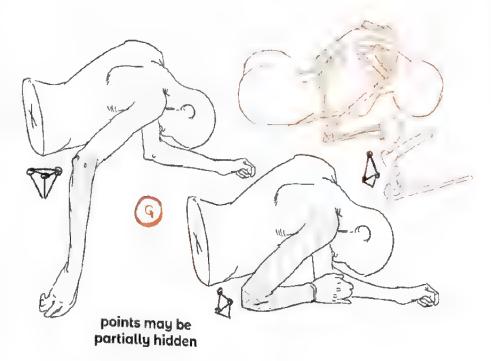
three major attachment points (C):
the olecranon process of the ulno and
the two epicondyles to either side of
it. Always think of this triangle when
drawing the elbow. Sometimes you'll
see all three points; sometimes you'll
is at see one as the others are buried.



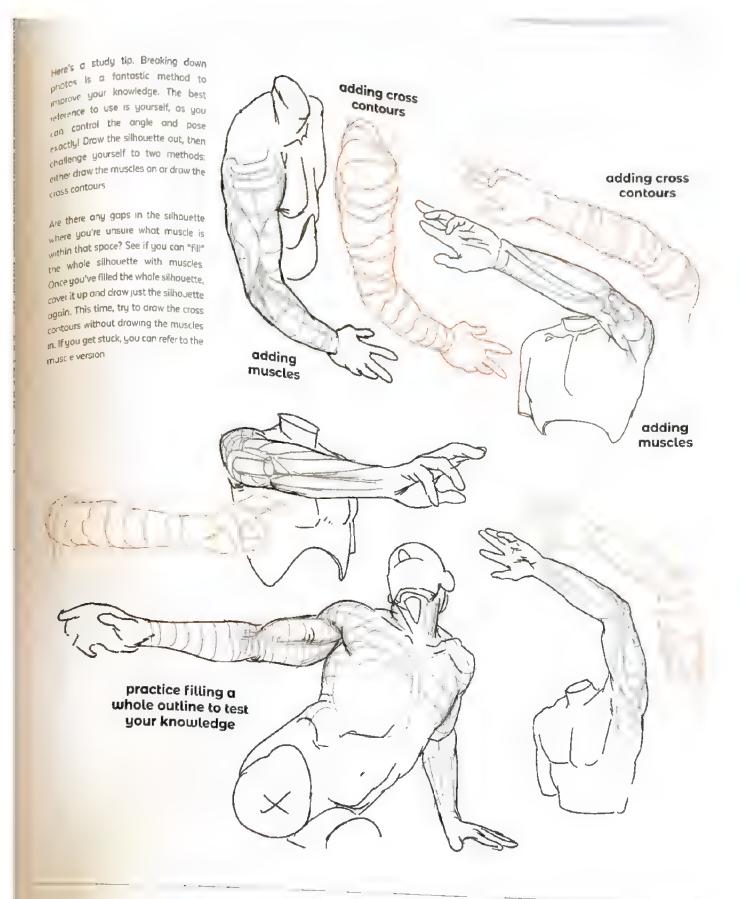


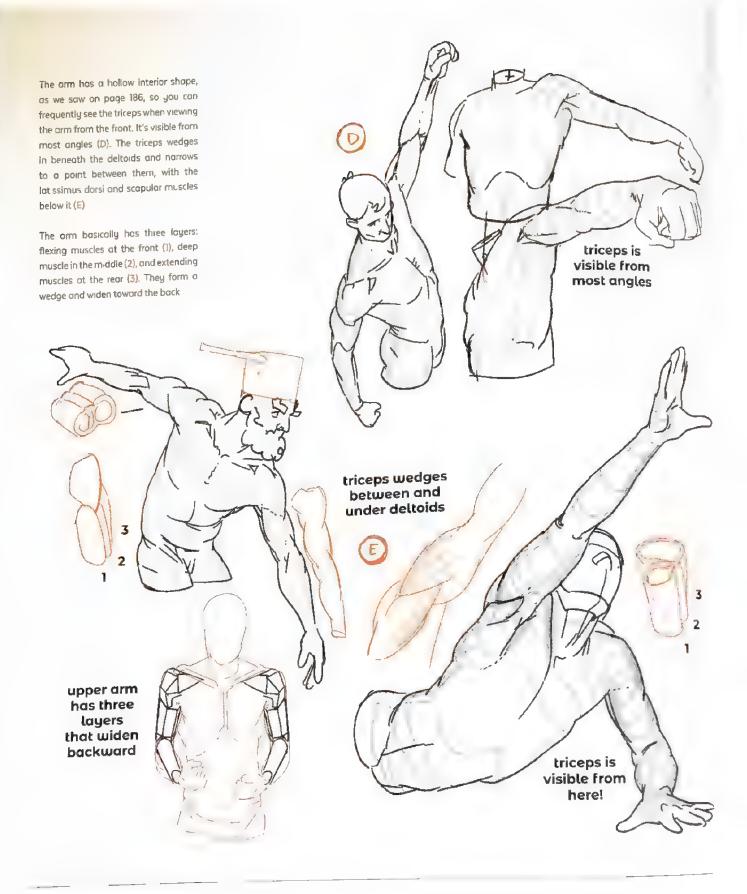
nclude just a suggestion of the elbow's structure. In D we see no hint at all and the sihouette struggles to convey the selbow's form in E we see a slight mark, elbow's form in E we see a slight mark, which is enough to help the viewer Our visual library is vast, so we need only the subtlest of hints to recognize only the subtlest of hints to recognize structures. Recall and recognition are very different skills, and despite not being able to "recall" and despite not being able to "recall" the structure of the arm, most people will recognize it instantly without any training at all

It can be helpful to draw out the triangular elbow landmarks as a 3D pyram d shape, to check the relative reights and positions of those three major attachment points (F). However, is mentioned, remember that we won't always see all three points of the became their form, but have the infidence to deliberately leave one if the pose or angle calls for it (G).



tip: arm muscles & forms muscle doesn't end at joint! If we see a concave curve on one side, we'll often see the opposing curve on Muscles don't begin and end at joints the other side of the form (8) This That's a common misunderstanding nterlocking is a useful trick if you Muscles wouldn't serve their function if they ended exactly at a joint (A)! need to draw a figure but have no clue about the anatomy! Take a guess at Instead, they averlap and wrap around the opposing curve and you're likely to the joints more than you'd expect If you're not sure where a muscle be correct (C) attaches, ask yourself, "Where would it best attach to furfill its purpose?" opposing try guessing curves create oppos to natural flow!



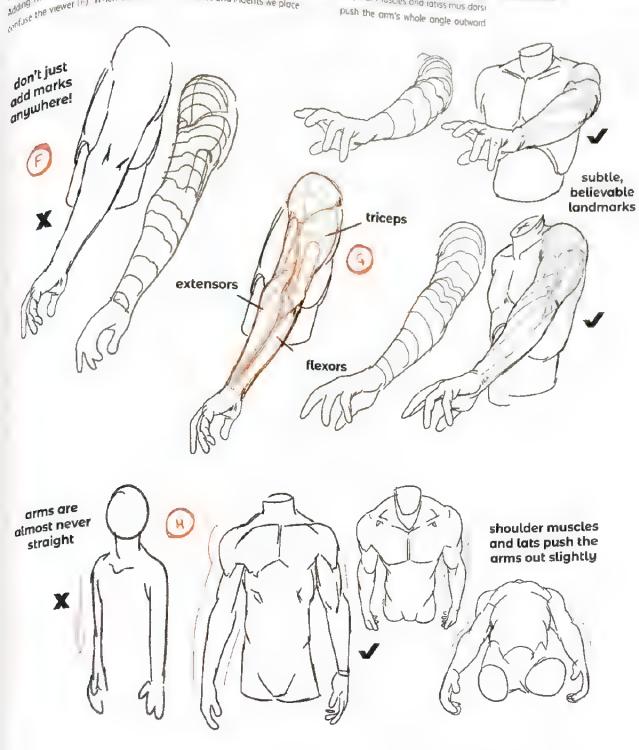


non't think that you can just add a few and the arm will have form! and the arm will have form! adding marks that aren't correct will hading marks that oren't correct will hading the viewer (F). When we draw confuse the viewer (F).

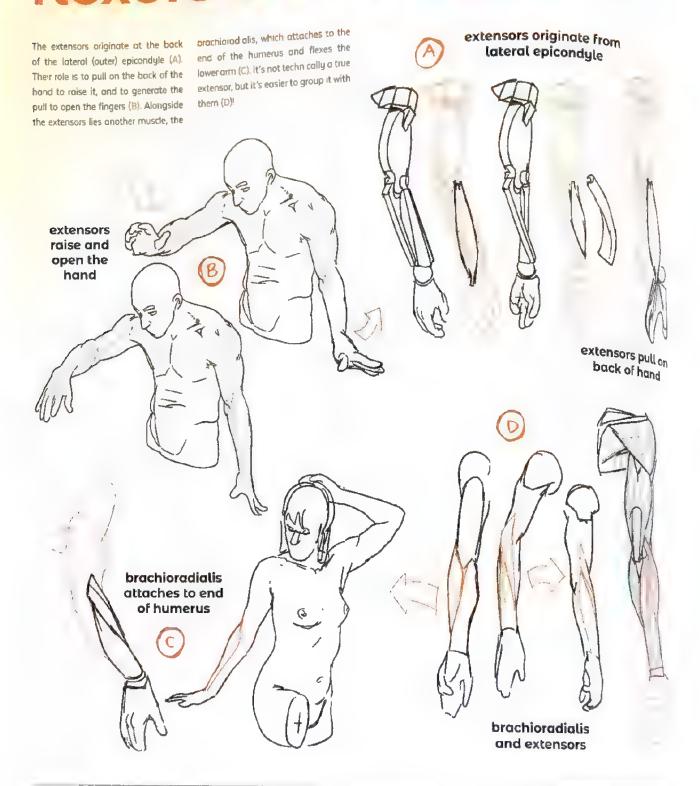
the arm, we want to be absolutely sure which parts are the extensors, the triceps, and the flexors (G). These guide the marks and indents we place.

When the arm is supinated or pronated it is almost never straight. The scapular muscles and latiss mus dorsi push the arm's whole and

slightly so the forearm doesn't just hang vertically



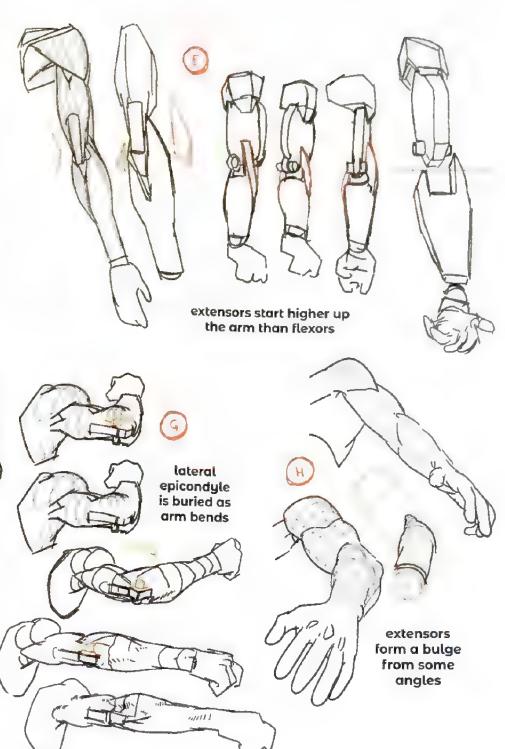
# flexors & extensors



Note the difference in height between the extensor and flexor groups (E). The extensors connect the outside of the extensors connect the outside of the arm (the bock-of-the-hand side) to the lateral epicondyle and the bottom section of the humerus. They start higher up the arm

Most of the extensors attach to the ateral epicondyle (F), but the largest extensor attaches directly to the upper arm instead. The brachioradialis is the biggest muscle in this area, but as we learned already, it flexes the arm rather than raising the hand. When we bend our arms, the extensors bury the lateral epicondyle (G)

When the arm faces us, the extensors form a prominent bulge on top (H)



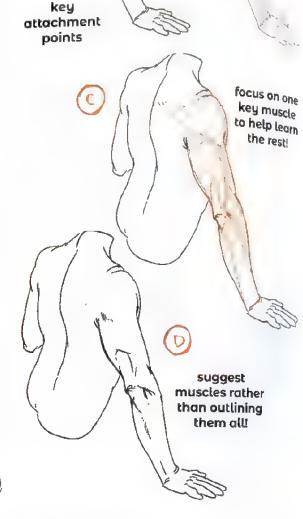
tip: stack your knowledge

Sometimes anatomy requires a bit of reverse engineering. If you start with a basic drawing of an arm and aren't sure where the muscles are located you can look for marks that indicate the bone positions (A). Then you can draw out the bones to give you the anchor points. Now you know the attachment points to build the orm!

For maximum efficiency, "stack" your knowledge. For example, memorizing the brachiaradialis is easy when we know the locations of the biceps and triceps. It just sits between them (8) If

you only have holf an hour, learn one muscle really well, rather than five that you'll soon forget. That one muscle then provides context for the rest (C)!

Constantly ask, "What muscles are on either side of this muscle?" Once you've identified the muscle locations, you can remove details until you find the minimum amount of marks needed to suggest occurate anatomy (D). For example, the deltoid always faces the lateral epicondyle. If you have an indent for the epicondyle, you have the direction for the deltoid, too!







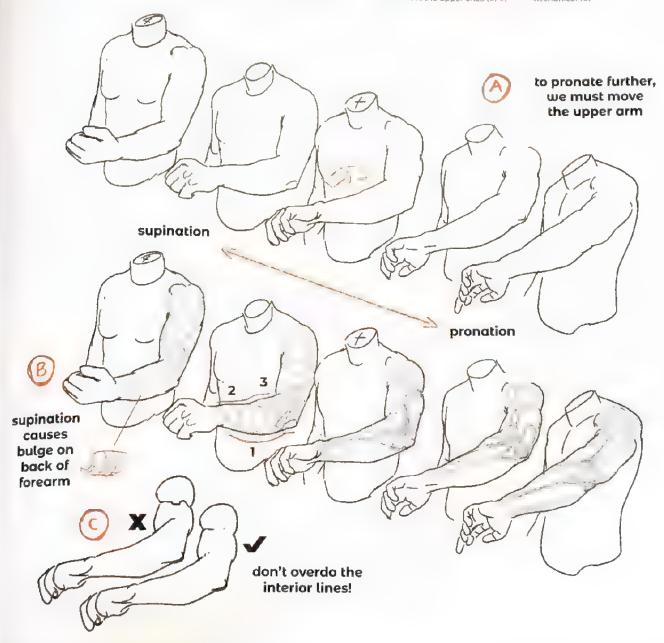
# pronation & supination

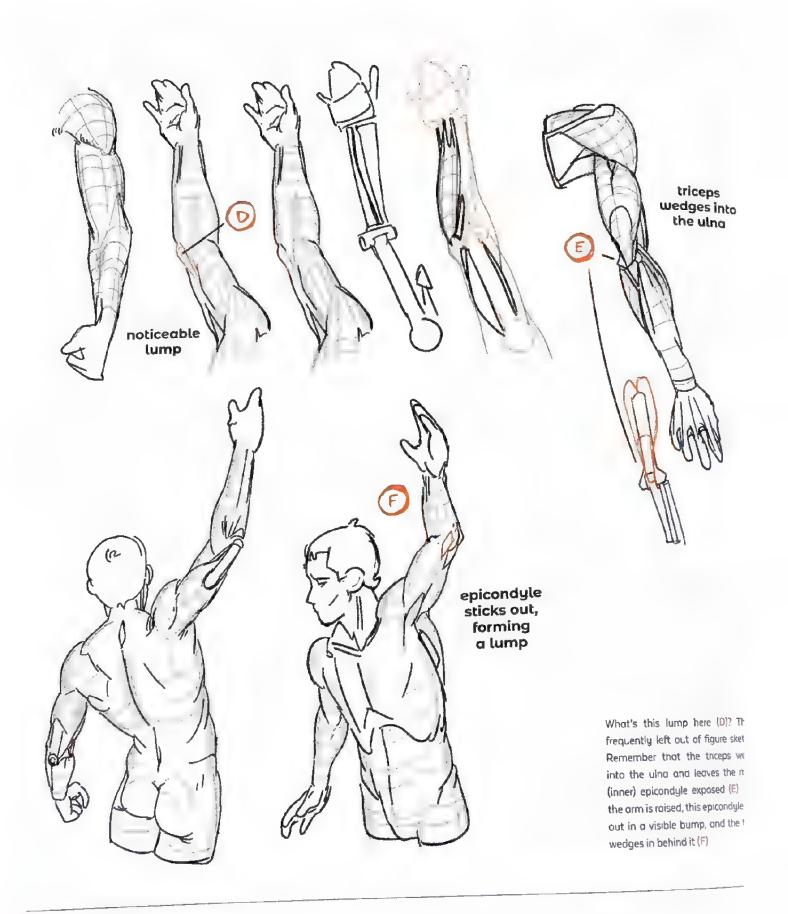
silhouette is everything when drawing the arms. They are the anatomical region we see most after the head, so we tend to pick up on mistakes when pranating the forearm (rotating it inward), there's a limited range of

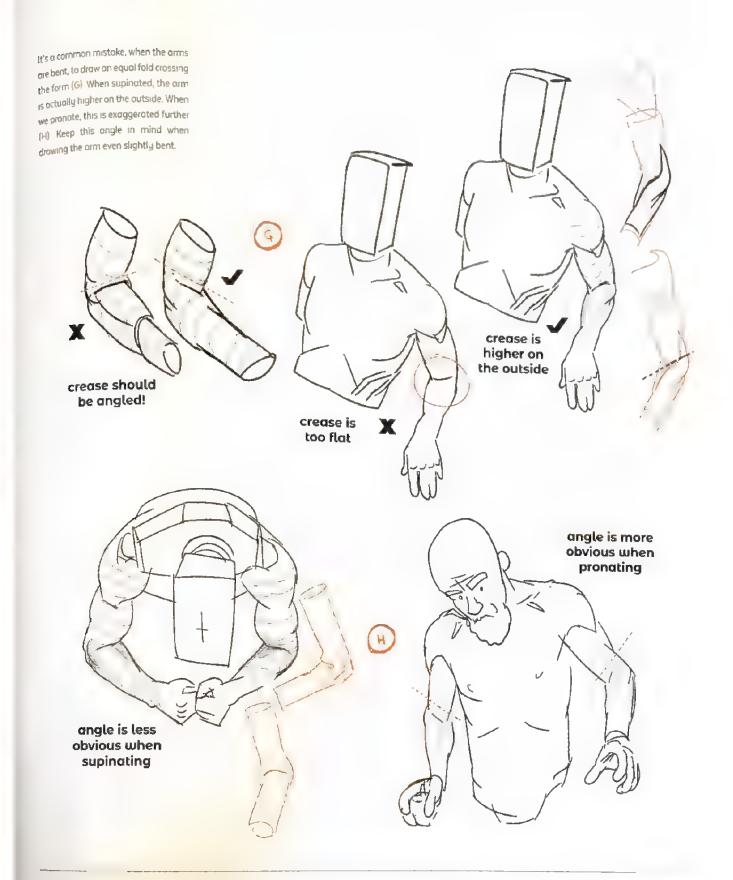
motion. Post a certain point, we must rotate our upper arm too, in order to achieve the twist (A). In suprnation (twisting outward), we see a bulge on the back of the forearm caused by the extensor muscles lying flat against the

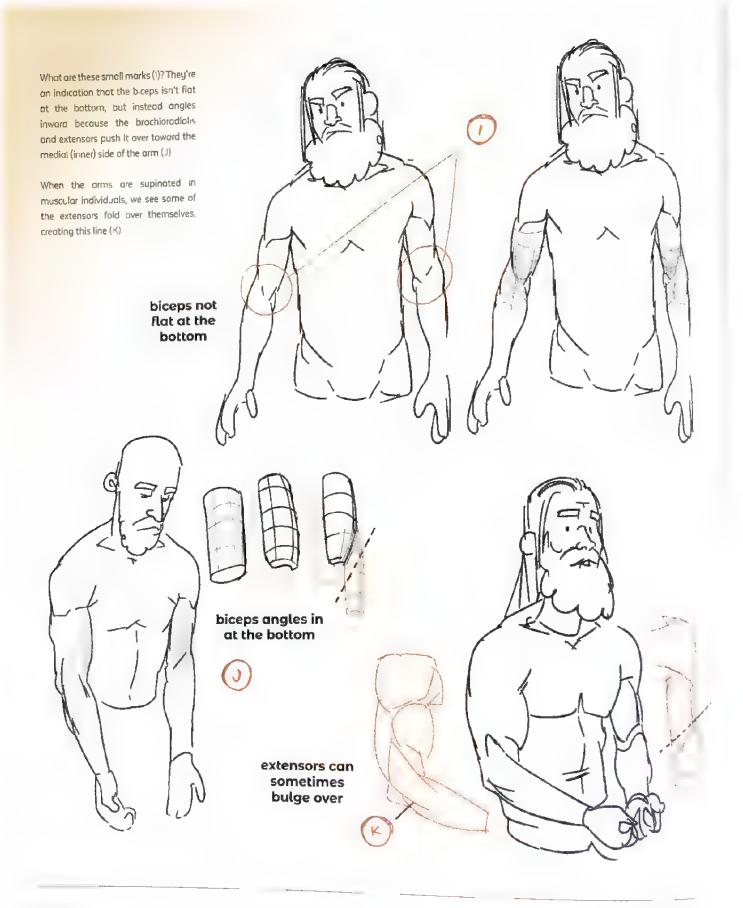
bones (B) In pronation, we see a bulge below as the flexors hang down ~ i always think of this as being shaped like a rhino's stomach (1)! Above it we can see two steps up as the lower extensors meet the upper ones (2, 3)

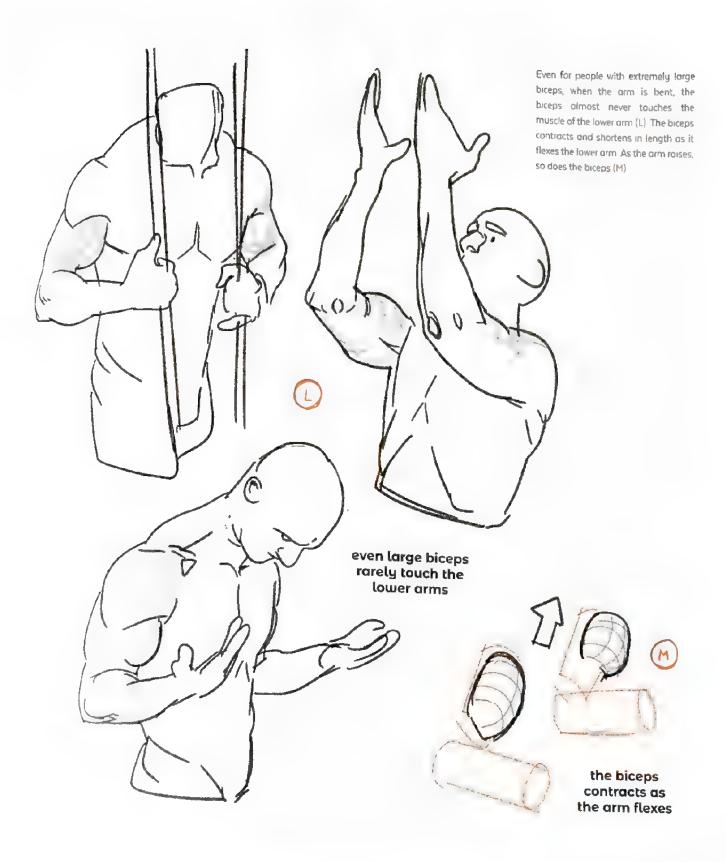
Where we draw overlaps, remember to keep them subtle. The arms have many subtle bumps but, overall, are basically tubes. If we draw too many nterior lines, the arms will begin to look mechanical (C).





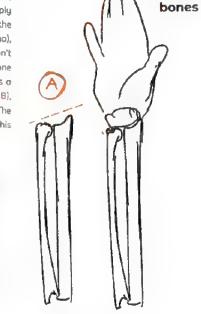






### carpals

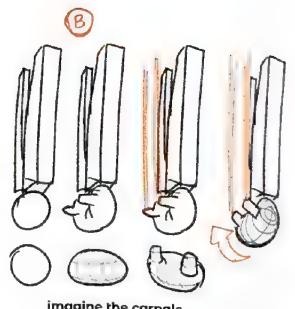
The bones of the hand can be entimidating, as they look complex, but let's break them down as simply as possible Attached to the end of the lower arm bones (the radius and ulno), we have the carpals (A). You don't need to memorize each carpal bone – instead, we can imagine them as a small ball that gives us flexibility (B), supporting hand movement (C). The otherhandbonesw libe attached to this ball-shaped mass (D)



carpals

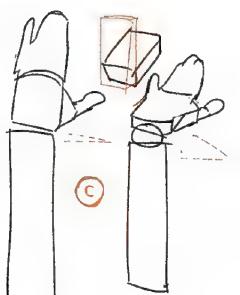
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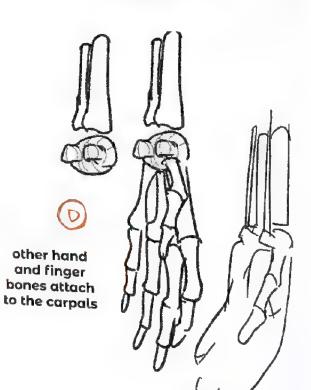
lower arm



imagine the carpals as a squashed ball!







carpals support hand movement

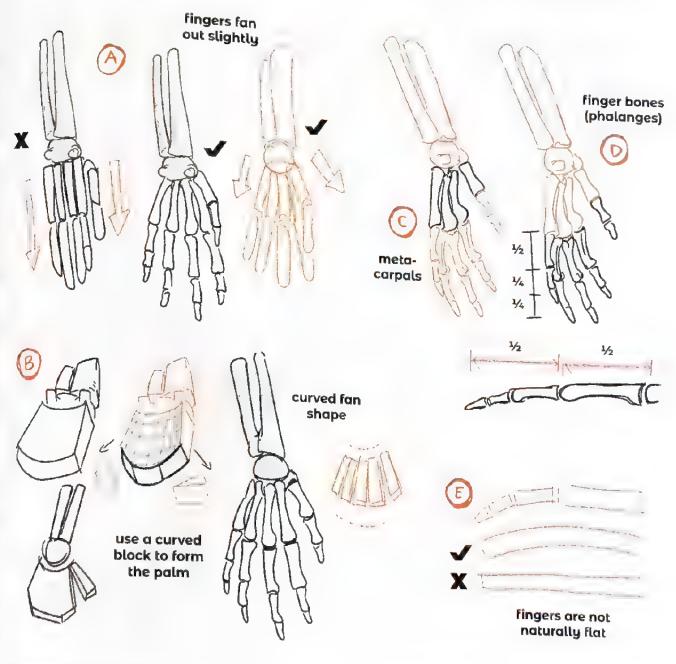
# fingers

The fingers themselves aren't parallel They expand outward from the carpals [A] We can form the palm of the hand by curving a block, and then chopping the comers off, because the fingers

wrap and don't begin in a straight line (B). The same is true of the knuckles' position on the back of the hand. The metacarpals (meta means "after," so Lterally "after the carpals") form the

mass of the hand itself, and attach directly to the fingers (C). The finger has three segments called phalonges, while the thumb only has two (D). The first phalonge of the finger is

the same length as the second and third together. Not only do the fingers radiate outward, they also form a scoop shape and rarely lie flat unless held in a tense pose (E)

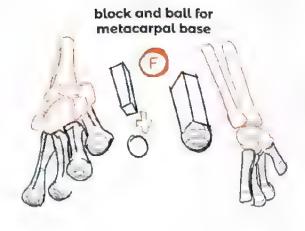


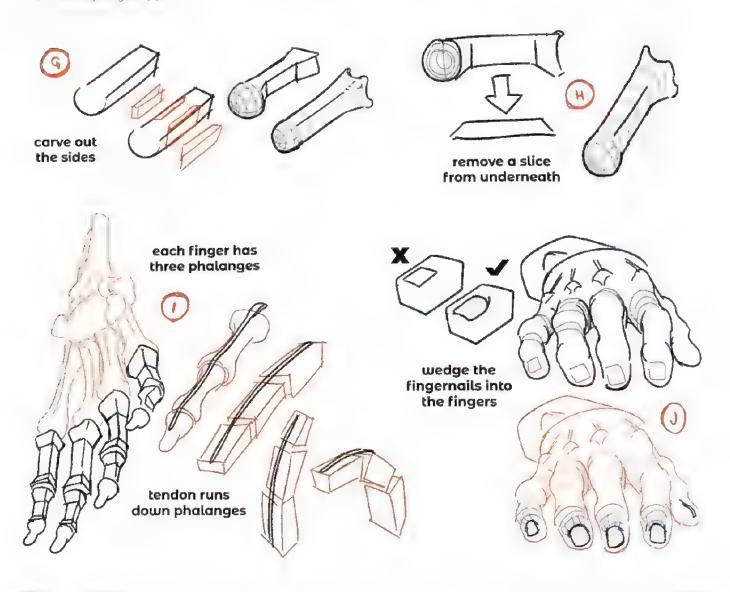
The metacarpals aren't just tubes they're each shaped like a rectangle with a bulbous end. Those ends are rounded and covered in cartilage so the phalanges can bend around them, allowing our fingers to curl in

To draw a metacarpal, take a rectangular block and add a ball on the end (F). Take two slices out of the block's sides so that the form tapers in the middle like an hourglass. This allows space for the muscle and connective tissue to attach in between and hold the fingers together (G)

Finally, remove a slice from the bottom of the black, so the metacarpal forms a sort of orch (H). The phalanges mirror this shape exactly, except for the final phalange (the fingertip), which has a pointed end. The three completed phalange shapes form the fingers, and each finger has a tendon along the top to help move it (I)

The fingernails themselves have to look like they're wedging into the fingers, not just sitting on top (J)





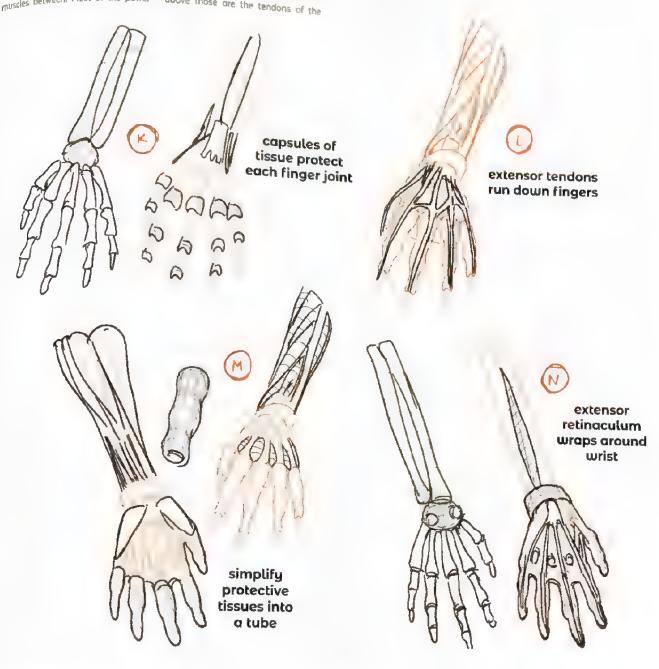
Between the radius and the uina, we have connective tissue that stabilizes the bones to prevent them from separating and also provides an attachment point for same of the muscles of the farearm. The hand is really a mass of connective tissue and tendans, with a few small muscles between, Most of the power

generated for opening and dosing the fingers comes from the lower arm, so really the hand is just banes and their connections covered with some skin and fat

We have "capsules" that cover the actual joints of the fingers (K), and above those are the tendons of the

extensors, particularly the extensor digitorum (literally "finger extender") (L) Above the tendons are all sorts of protective and strengthening tissues, with names like "extensor hood," but we can simplify them into a rubbery tube that sits above (M)

Finally, we have the extensor retinaculum, which is just above the hand, wrapping around ike a sweatband it gives support to all the tendons that run around the wrist and gathers them together (N)



designing the hand

hand has limited

upward motion

compared with

downward

90° flexion

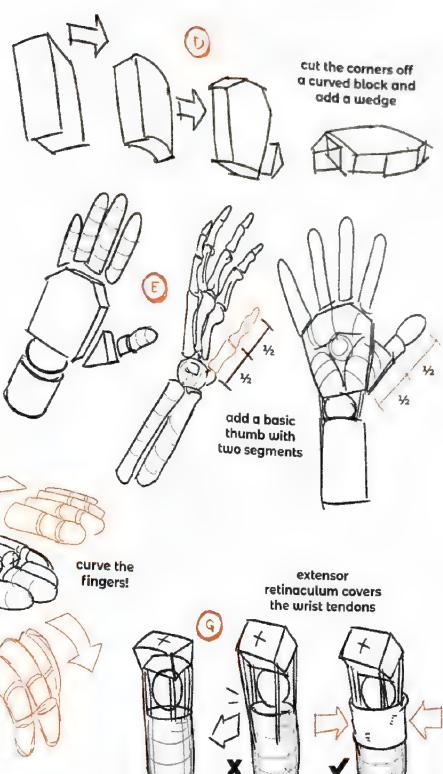
So let's begin designing our simplified mannequin hand, starting with some basic observations. Dan't warry about getting all the best anatomy resources - a mirror and some focused attention will give you the real secrets!

First, we can see that the hand's range of motion is limited when raising it up (extension). The extensor muscles con only raise your hands 35-40 degrees. in contrast, our flexors can flex the hand almost 90 degrees voluntarily, and even further with some added pressure (A). The hand itself has a delicate curve that matches the top of the forearm (B).

Note that when we bend our hand forward, it doesn't move down vertically, but usually angles outward signtly 1.

35-40° extension hand has a curve that follows the forearm C hand angles out slightly when bending downward

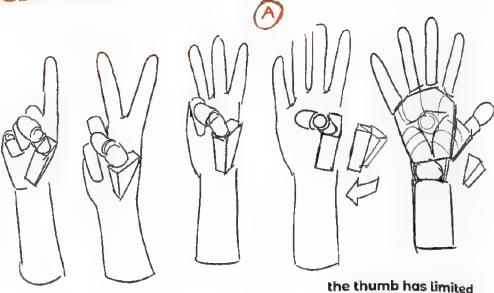
start the hand design with a block, the name uergil with a block, start the corners, and give it some going of the corners, add a triangle on a round of the corners. pund off the curriers, and give it some and of the this, add a triangle on the divolute to this, add a triangle on the divolute to this of the thumb for curvature to the thumb (D), and the thumb for the thumb segments for the thumb and segments for the the segments for the s ede for the naise of the thumb, segments for the thumb, two small segments metacornal two small places are the segment and the two small segments for the thumb, two small segments metacarpal and represent ng its base metacarpal and represent anges (E). representation anges (E). The main challenge isn't the anatomy, The main the posing. The forms don't need the posing, but they do need the posing they do need the position they do need the they do need they do ne but the pushing, but they do need to be to be when the samplex, but they do need to be to be consumed to be to be what a hand posed well. We all know what a hand posed well vorious emotional states! simple fingers with two joints Add simple extend our fingers and we rarely extend our fingers and each are straight, so gently curve them out straight, see how the thumb out (F) See how the extensor the holds the tendence them invition holds the tendons in (G). et naculum the hand the tendons five pulled on the hand the tendons if we would likely pull away w thout it



the thumb

Visualize the base of the thumb as a triangle that can swing outward and inward it has a great range of inward motion for grasping things, but is limited in outward motion (less than 20 degrees) (A). The muscles on the interior of the palm are actually quite small, but are cushioned by thick connective tissue and fat. The general shape of the muscles is shown here (B).

When the thumb is bent inward, don't just bend it over the inner volume of muscle – actually embed it into the mass. It needs to really sink into the form to be believable (C)! Practice arawing the palm of the hand with just o thumb and little finger. Move them around like joysticks and practice overlapping the forms of the hand.



outward motion



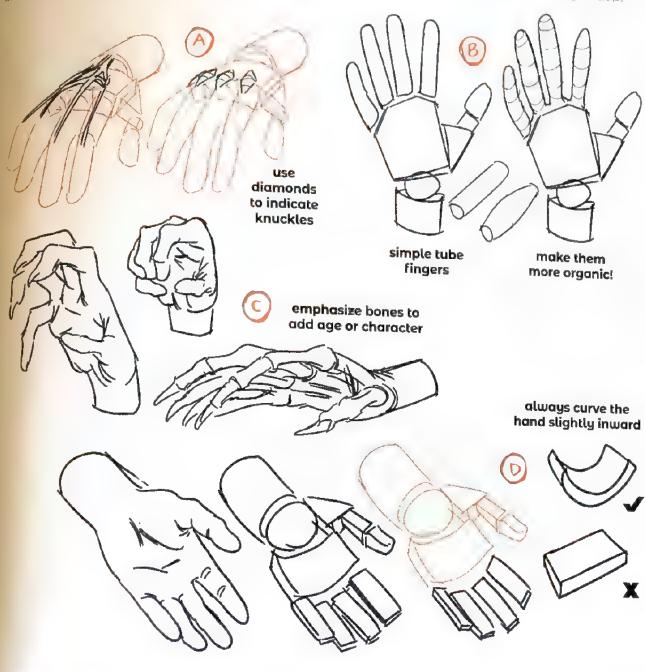
## knuckles

To represent the knuckles, you can draw simple diamond shapes on top of the joints where the metacarpais meet the fingers (A) As a quick solution, when you're not interested in drawing

details, you can simply draw the finger as a tube with a bulge in the middle to represent the main joint. Making this bosic tube more organic helps add realism (8).

Less fat and flesh will make a hand look older and give it character. To draw a really creepy hand, just emphasize the bones even more (C)!

When the hands are extended, don't make the mistake of drawing the forms parallel and flat, instead, give them a gentle angle inword (D)



On leaner people, you'll often see the tendons of the flexors (which close the hand) in more active poses. Don't overdo this, though – just adding one or two can add power to your pose (E).

When drawing folds in the skin, remember that they don't originate from a central point like a starfish Instead, have them clearly overlap each other and choose which line is in front of the other (F).

It's natural to want to draw the loose skin on the knuckles on the top of the hand. Before you do, ask yourself, "Is this appropriate for the pase and model?" Frequently, the skin on top has no clear folds, just some suggested lines. Drawing more folds usually suggests older hands.

When we make a fist, our fingers are almost never parallel (G). You can make a fist with your fingers parallel, but it will look unnatural! The index finger, closest to the thumb, is usually

raised higher than the others to make room for the thumb.

In all these examples, we can see one thing that's worth noting: When the fist is clenched, a small bump appears at the side, where the skin bulges (in this adds realism and tension, so is always worth including.

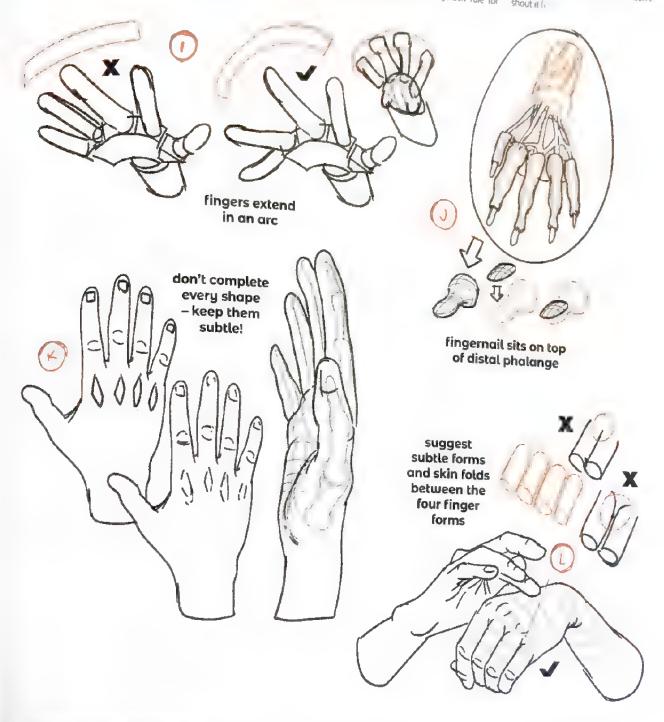


When we extend our fingers in a relaxed way, they form an arc rather than a straight line across (I). We than a straighten them with effort, but can straighten them with effort, but because our metacarpois are curved, because our fingers when extended

The distar phalonges (the end bones of the fingers) have a strange shape if you pinched a piece of putty and flattened the end, you'd pretty much make that shape. The fingernal sits on top of this small, flattened form

(J) Fingernalis are surprisingly hard to draw, because they curve and wrap over but are also rounded at the ends When drawing the knuck es and fingernalis, remember Don't complete shapes (K1 This is a golden rule for

drawing onything. Just suggesting a shape gives so much more realism than completely autlining it, such as the webbing between the fingers. Whisper the form to the viewer - don't shout it for

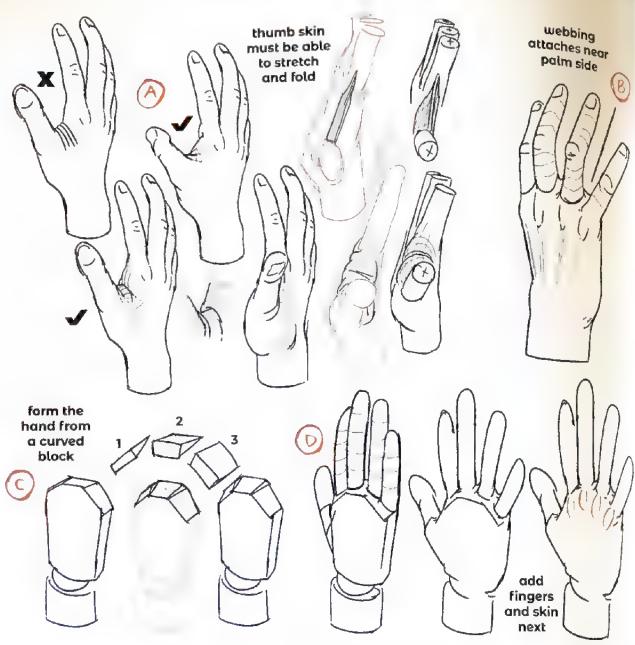


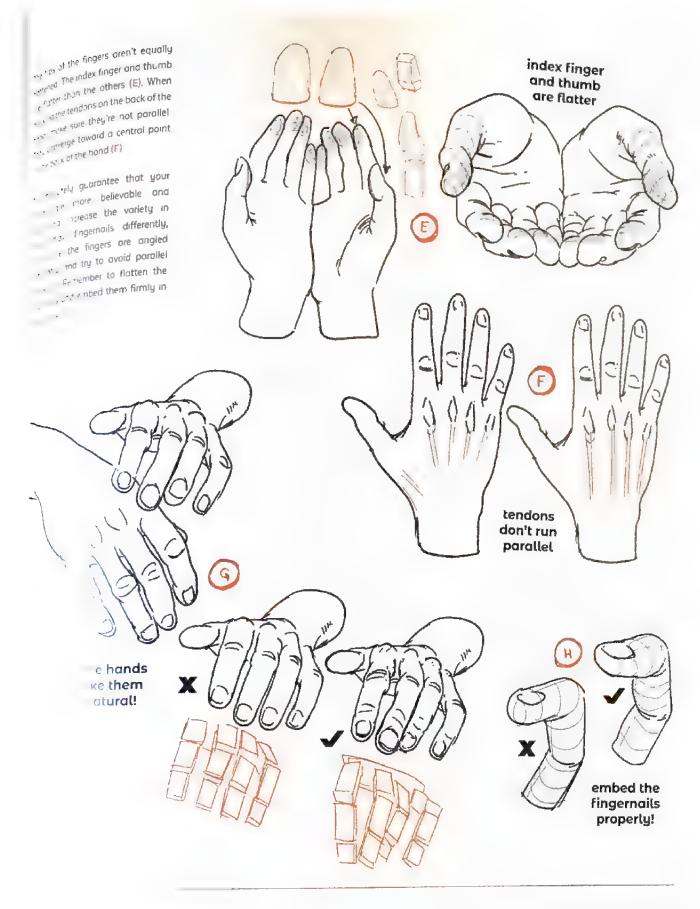
#### believable hands

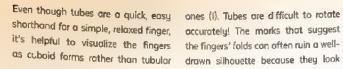
When we draw the skin connecting the too many creases (A)! The fingers thumb to the fingers, consider how it will stretch and fold. The form should excess skin to form creases, but not middle of the fingers (B)

themselves have webbing between them, but it attaches near the inside of wrap over itself and have enough the hand, never near the top side or the To practice adding the skin between the fingers, take the box shape of the hand and slice off the top section, so the whole hand is scoop-shaped (C)

Then attach the fingers as single tubes, and add the webbing being them on the inner side of the hand

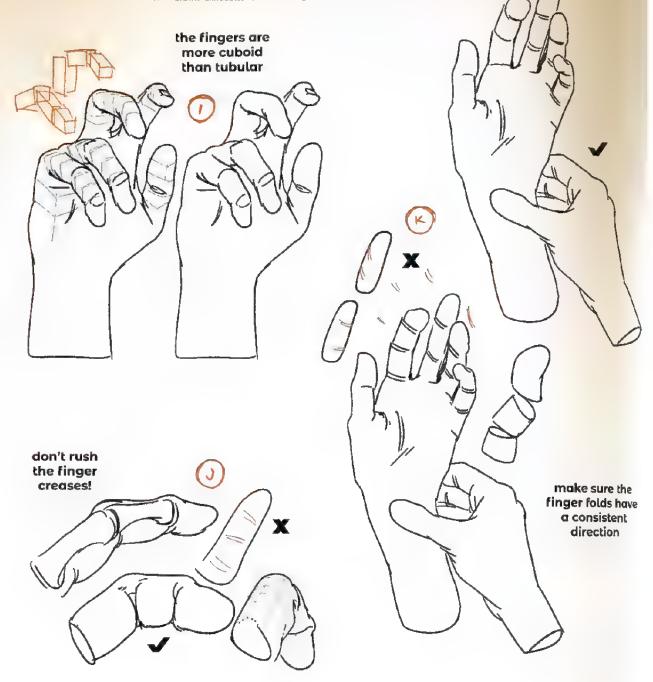


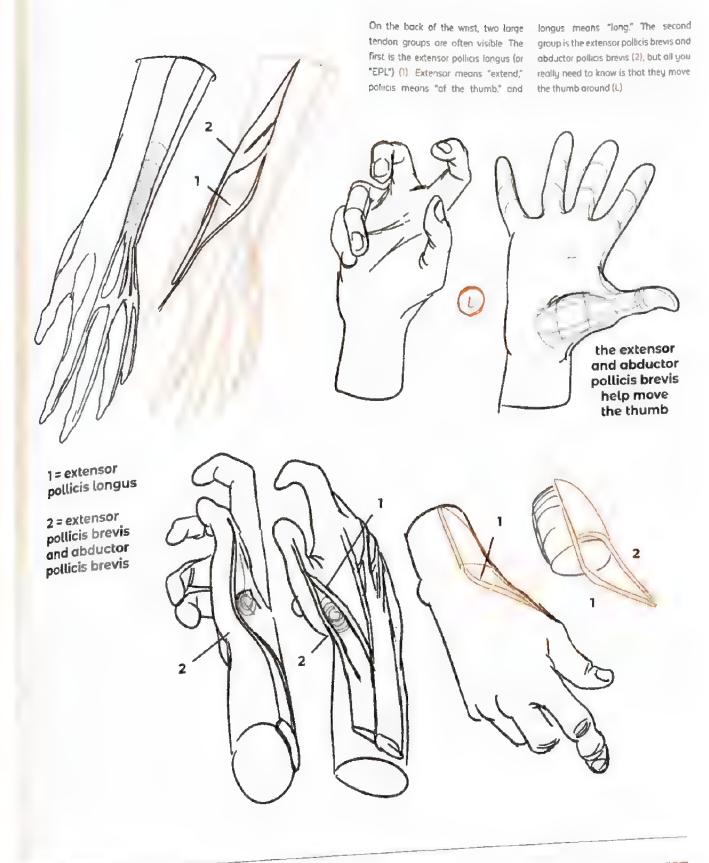




accurately! The marks that suggest the fingers' folds can often ruin a welldrawn silhouette because they look

rushed and suggest different rotations for each finger (J). Variety is important, but a few carelessly placed lines can cause a finger to look warped (K)!



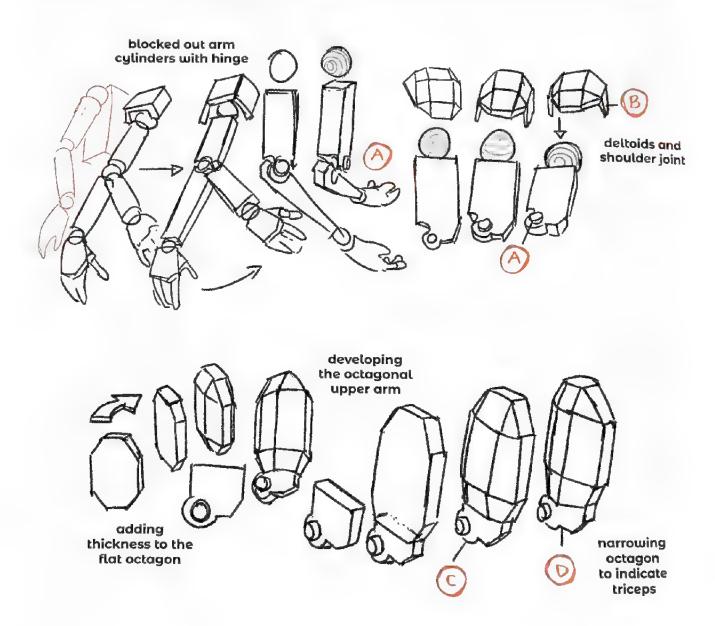


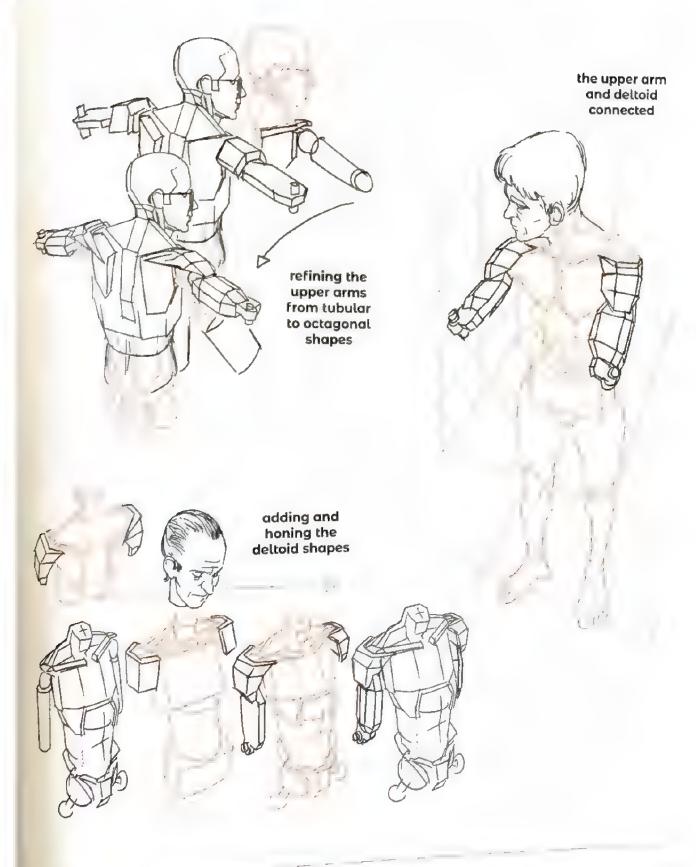
#### arm summe

We've completed our journey down We started with flattened cylinders, to the arm to the hand, so let's have a run through how we've developed our mannequin arm's level of detail.

which we added epicondyles to form the hinge of the arm (A), with rounded notches to allow movement.

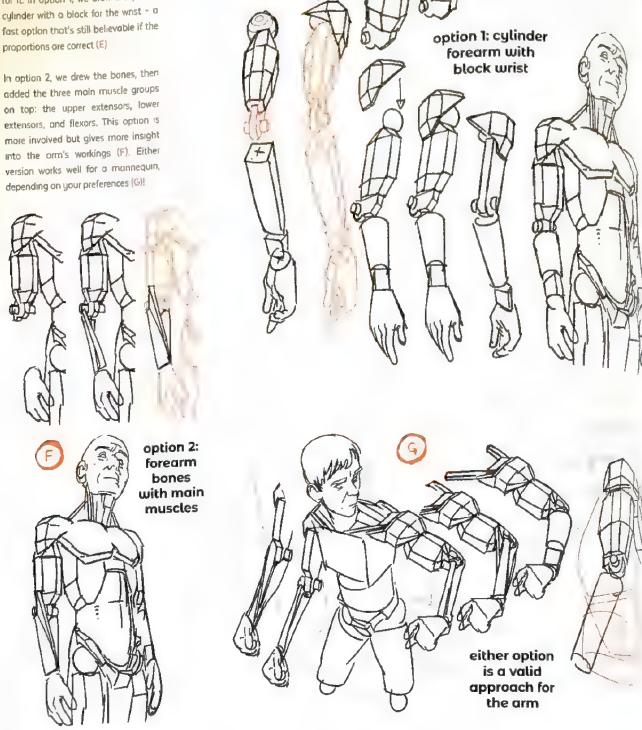
Next we added the deltoids above the ball of the shoulder joint and showed how they attach into the outer ( ateral) side of the arm (B). We developed the upper arm into an actagonal shape (C) and ensured it was narrower at the front than the back to show the width of the triceps (D).

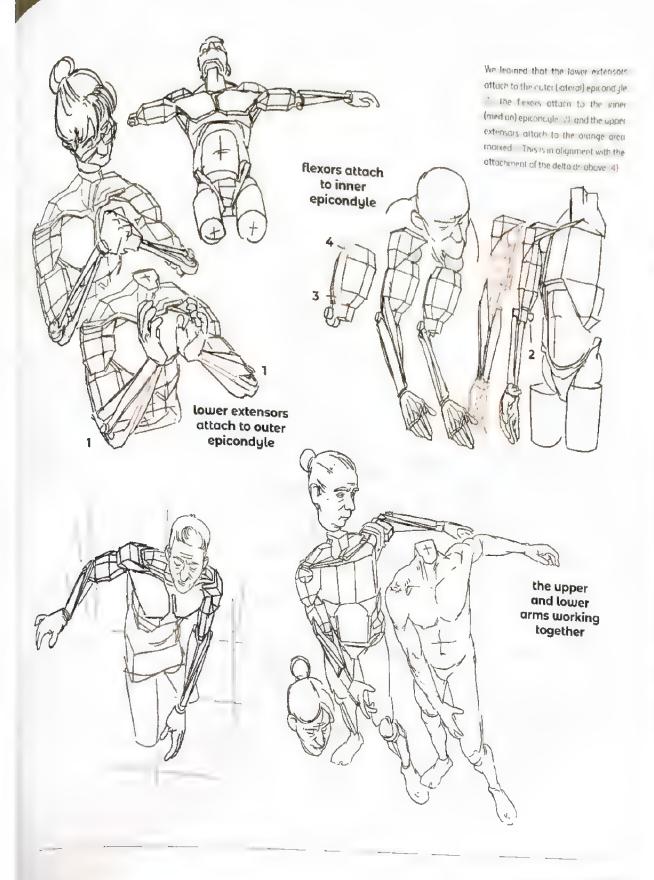




The lower arm is trickier because it changes shape with supination and pronotion. We created two options for it. In option 1, we drew a tapering cylinder with a block for the wrist - a fast option that's still believable if the

added the three main muscle groups on top: the upper extensors, lower extensors, and flexors. This option is more involved but gives more insight into the orm's workings (F). Either version works well for a mannequin,





# lesson 4: the content of the content

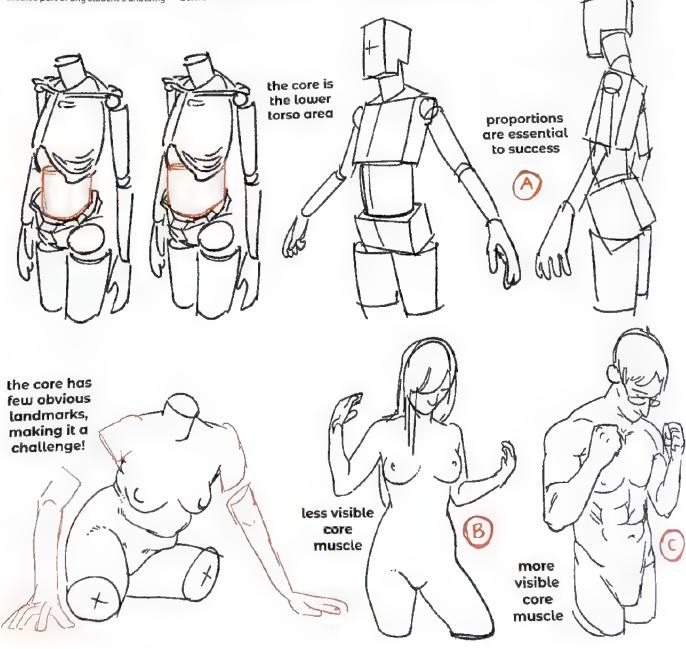
often poorly understood. So much of the body's strength and mobility comes from this flexible area, as we'll discover in this section.

# what is the core?

Now let's examine the "core" – the lower part of the torso, roughly comprising the abdomen and mid to lower back. It's usually the least studied part of any student's anatomy

knowledge because it has fewer obvious external landmarks. Without a strong understanding of the pelvis, it's virtually impossible to draw. Before we cover the bone, remember the proportions are what give your drawings form, so focus on those first, and the accuracy of the bones and muscles after (A). The ratio of hips to core to rib cage is powerful.

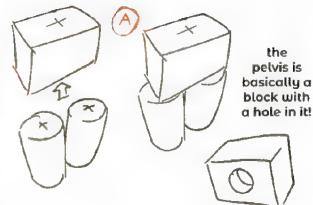
When drawing the core you'll usually not need to add many interior lines. Most people have few or no abvious core muscles, and look more like 8 than C.

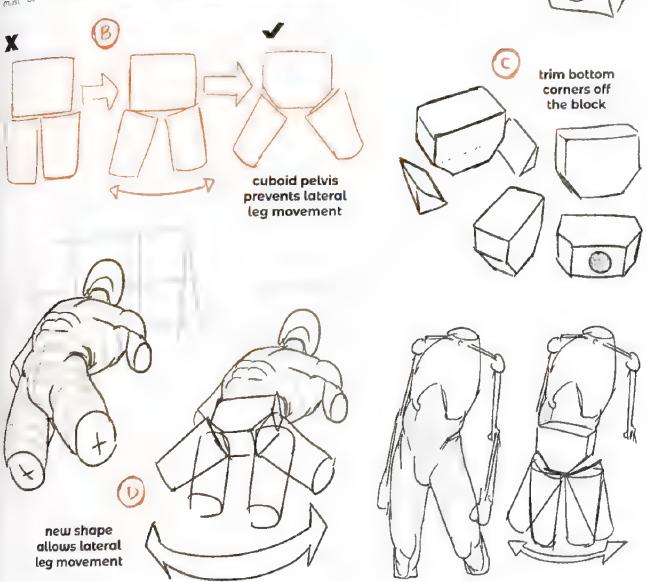


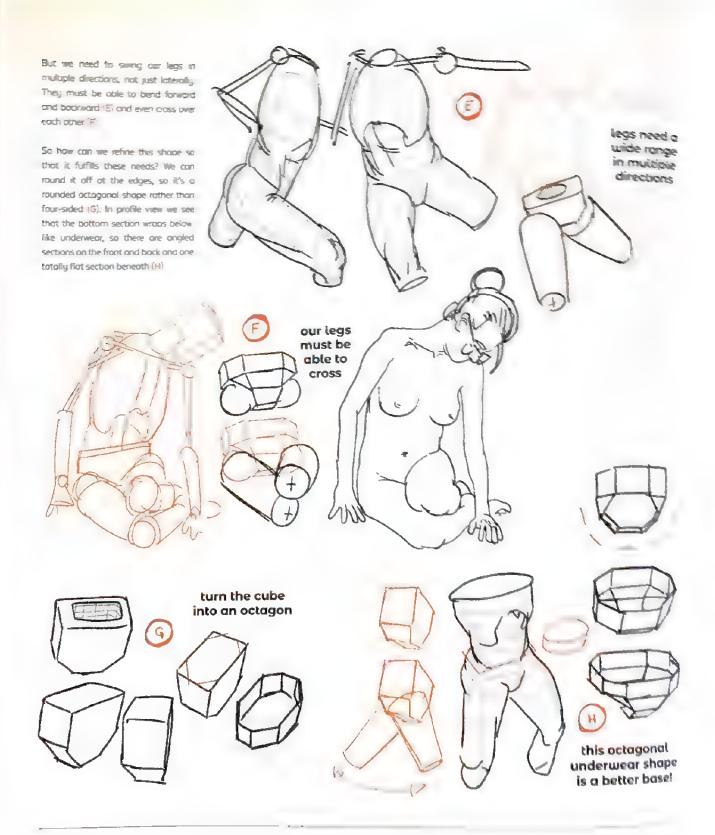
# the pelvis

Let's visualize the pelvis as a block. what role does the pelvis need to play" It forms the end of our digestive system, so we need a continuous bottom for excretion (A). It also needs to provide a stable base for the torso and legs to pull on. The legs and torso must be allowed their maximum

range of motion and be able to swing in multiple directions without being impeded. If we attach two tube forms to the battom of a cubo d, it doesn't space within it, with a hole at the allow for much movement because the edges of the forms would prevent it (B). Solution: round off those edges (C)! This allows the legs a wider range of lateral (sideways) movement







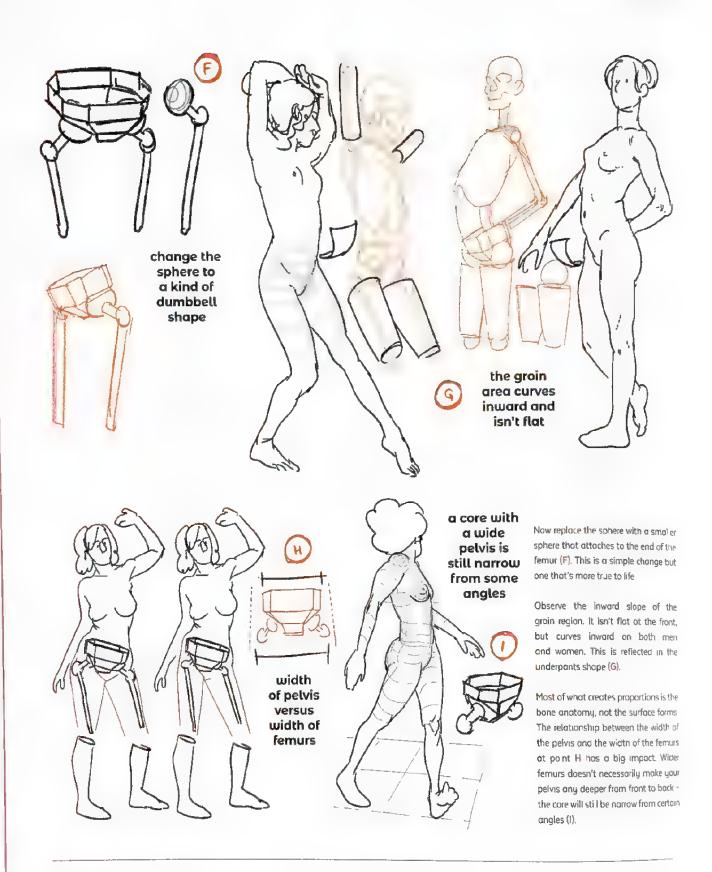
#### the femurs

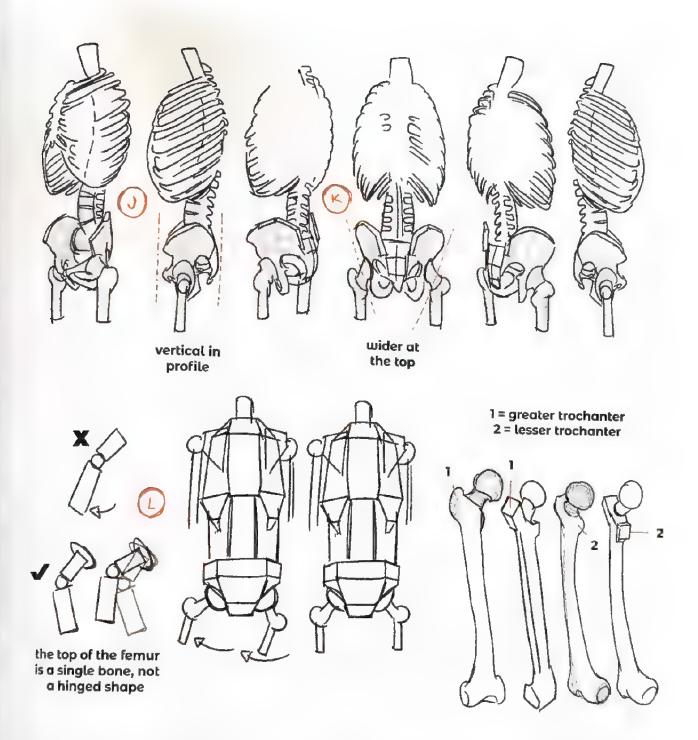
Next we need to insert two spheres into the peivis, representing the bail-and-socket joints of the femurs (A). The femur is the bone of the upper leg, and the largest bone in the bady. Just like the arm, the leg has one bone for the upper part (B) and two for the bottom.

Here's an easy way to add these joints (C): Draw the underpants shape in the same orientation as the box (1) and give it some thickness to improve it (2) Add two spheres that hang lower than the bottom of the underpants shape This allows extra mobility (3)

There is normally an overlap where the front leg covers the rear (from the camera's POV) (D). Occasionally this gap will allow you to see all the way through to the glutes at the back, but that's rare (E).







Now we have a basic pelvis model, let's examine the pe vis and spine more closely. Viewed in profile, the front of the pelvis is almost completely vertical when untilted (J). If we ignore

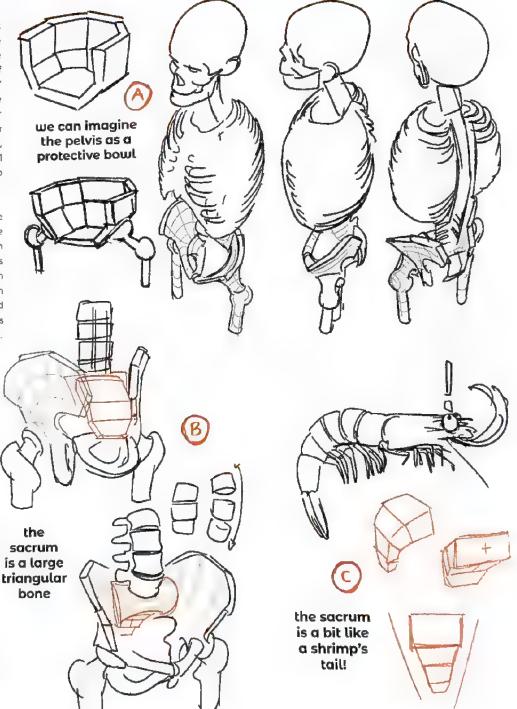
the femur, we can see that the pelvis is wider at the top and tapers toward the bottom, like the underpants form we blocked out earlier (K) The femur is a single bone Section L is not a joint, but an attachment point—it is immobile. The hinge motion of the leg moves from the ball-and-socket of the pelvis. This mass is known as the

"greater trochanter" (1). There's also a "lesser trochanter" below it and inside (2). A trochanter is a bony protuberance where muscles attach

## detailing the pelvis

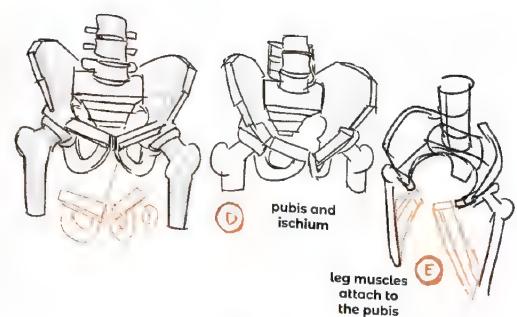
Here, we see the "wings" of the pelvis clearly. These are part of one large bone called the ilium, which is the argest bone in the pelvis. Instead of asking, "What does this bone look like?" try asking, "What is its role?" There are three answers to this question. It provides an attachment point for the muscles on the sides of the torso, it acts as a bowl to hold the internal organs, and it acts as a container to protect our lower digestive system.

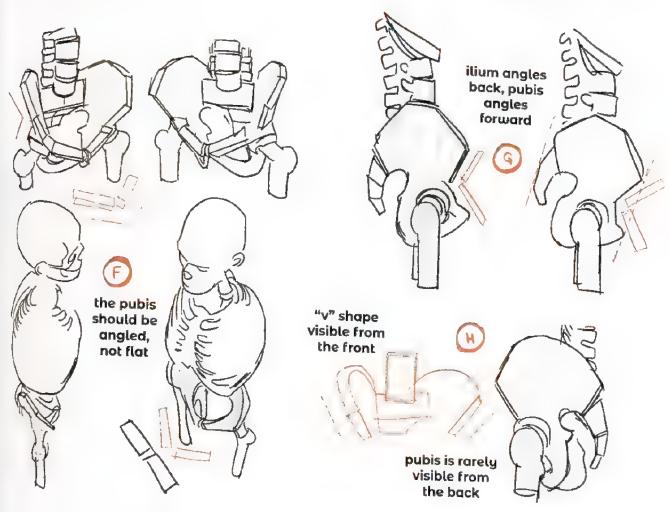
We can simplify it to something like this (A). There's an opening at the back where the two wings of the illum meet the "sacrum" (B) The sacrum is the triangular piece wedged between them, acting as the connection between the spine and the ilium, and holding the pelvis together lt curves back and down, like a shrimp's tail (C).



what else can we observe? What are these two forward-facing sections (D)? Those are the pubis (the straight bone) and the ischium (the loop-shaped bone that we'll cover ater). The main function of the pubis is to protect the bladder, intestines, and sex organs. The two bones of the pubis provide an important attachment point for the muscles of the leg (E). They are pointed forward, not flattened (F)

The front of the ilium angles backward and the pubis angles forward (G). The isolity of this depends on the tilt of the pelvis, but this "V" shape is what we should generally look for. When wewed from behind, we frequently not't see the pubis (H)

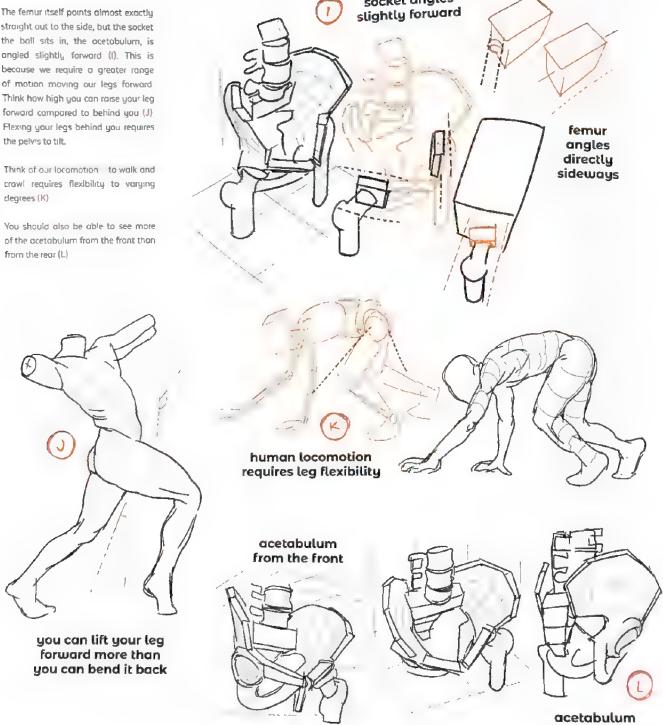




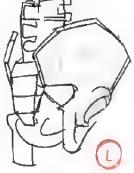
The femur itself points almost exactly straight out to the side, but the socket the ball sits in, the acetabulum, is angled slightly forward (1). This is because we require a greater range of motion moving our legs forward Think how high you can raise your leg forward compared to behind you (J) Flexing your legs behind you requires

crawl requires flexibility to varying degrees (K)

of the acetabulum from the front than from the rear (L)



socket angles



from the back

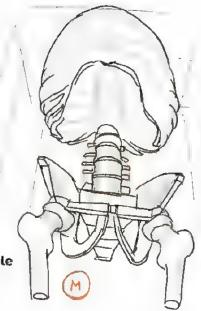
From below we see a ot of the balland-socket joints, far more than from above or behind. From angle M we see how clearly angled forward this socket is from behind we see very little of the head of the fernur (N)

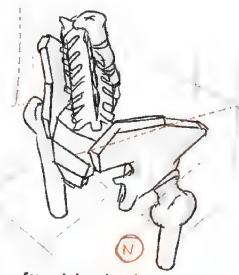
The femulis aren't angled 90 degrees. Instead, draw the angle around 45 degrees (0). The head of the fernur is covered in cartilage

Nate the outward floring of the ilium (the wings), which is particularly nobceable from behind (Q).

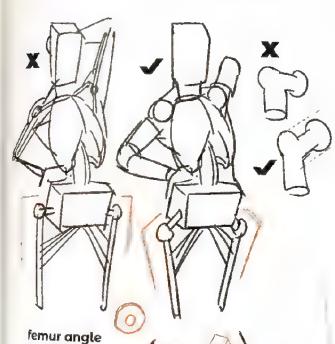
is around 45 degrees

sockets angle forward





femur's head and socket are less visible from here









ilium flares outward

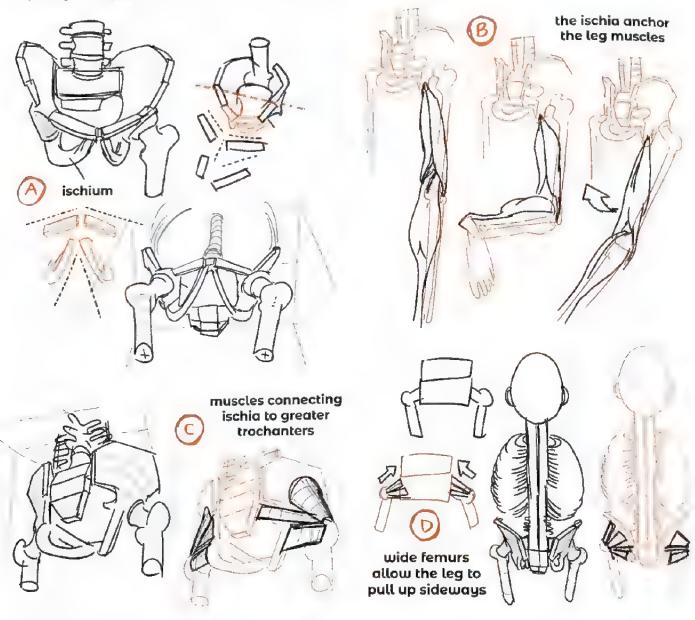
#### the ischium

The acetabulum (the "socket" of the ball-and-socket joint) is connected to a sort of "loop" hanging off the bottom of the pelvis (A). This is the ischium, mentioned on page 231 To understand what this is, let's consider the role of the pelvis again. The pelvis needs

to provide anchor points for the leg muscles to pull on, in order to move the legs forward and back. This is exactly what the two ischia provide (8)

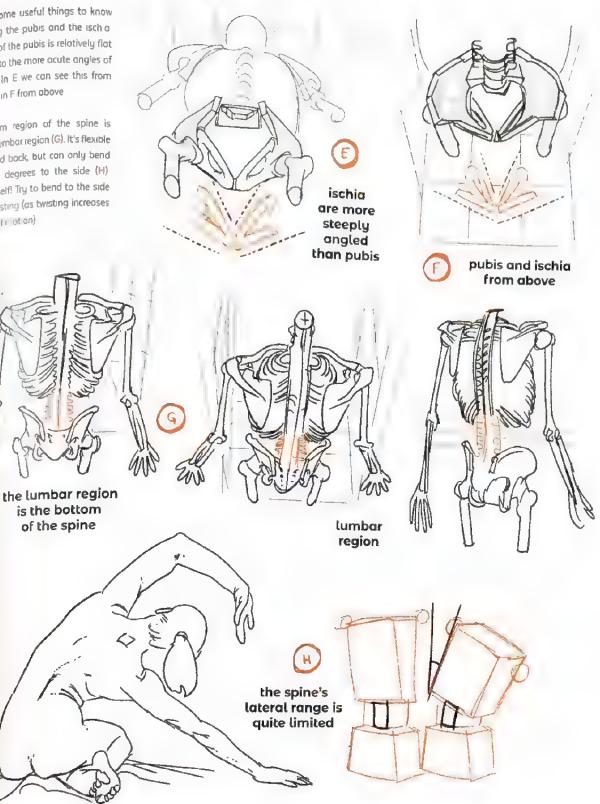
The two ischia are sometimes colled the "sit bones" because we can fee them contacting the chair when we sit. Some of the attaching muscles connect these loops to the greater trochanter (C) Now we're starting to understand what these weird bumps at the top of the femur are for! Without the femur being wider than the pelvis,

we'd have nothing to pull on if we wanted to move the legs out laterally (D) Nothing in evolution is there for no reason - understand the role and your subject becomes easier to memorize



Here are some useful things to know for drowing the pubis and the isch a The angle of the pubis is relatively flat compared to the more acute angles of the Ischia to E we can see this from below, and in F from above

This bottom region of the spine is called the lumbar region (G). It's flexible forward and back, but can only bend oround 20 degrees to the side (H) By it yourself! Try to bend to the side without twisting (as twisting increases the range of rot on)

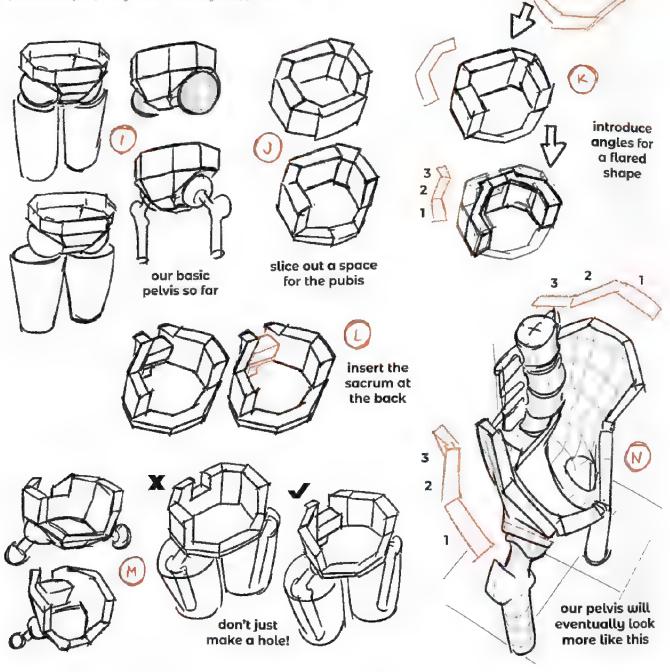


Let's use these observations to improve our pelvis shape further. We left off on page 228 with an underwear shape, with either a ball or more advanced femur shape (i). Starting with our octogonal shape, let's slice off the front section to represent the space above the pubis, leaving a small

section at the bottom to represent the pubis (J). We know that the pelvis isn't just an oval or octogon, but flares from back to front, so let's incorporate that flare using three clear angles (K, 1-3).

Add in a space where the sacrum sits, and wedge it in (L). This area isn't just

a cutout hole in the wall of the pelvis, but a whole piece with its own depth (M). Keep in mind that we're working toward a final design more like N, which is a simplified pelvis with the spine and femurs inserted, with clear angles to the flored shape

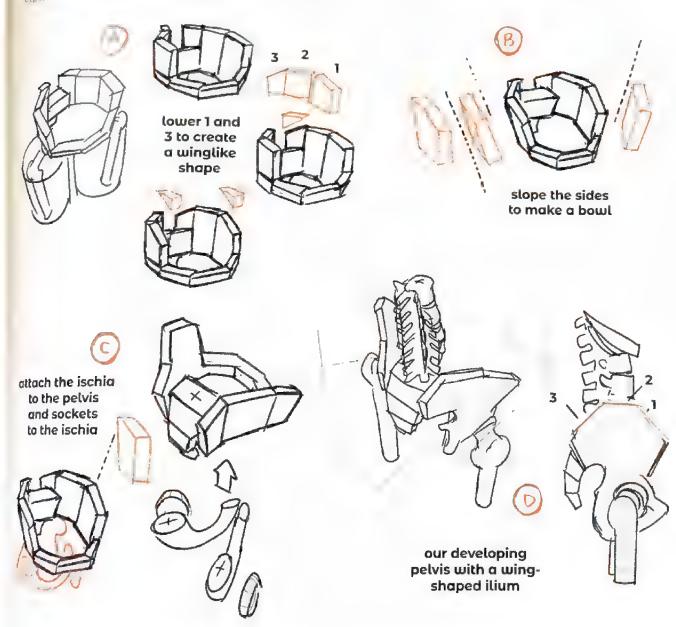


## re ining the ilium

"ared" mod , " what is most ell for 4 ; . I your current y, you're ready to depoptheleve + istail

gemember the time is no one. Now let's angle section 1 downward and lower section 3 on either side of the sacrum. This gives the ilium more self by rotating of the winglike shape of a real pelvis construct the multiple angles. If (A). Slope the walls inward to give the pelvis more of a bowl-shaped structure (B) The two ischium loops

attach below, with the acetobulum (the socket) attaching to the sides of the loops (C). The ischia are larger at the back than at the front. In D you can see how far the shape has come from the octagon that we begon with!

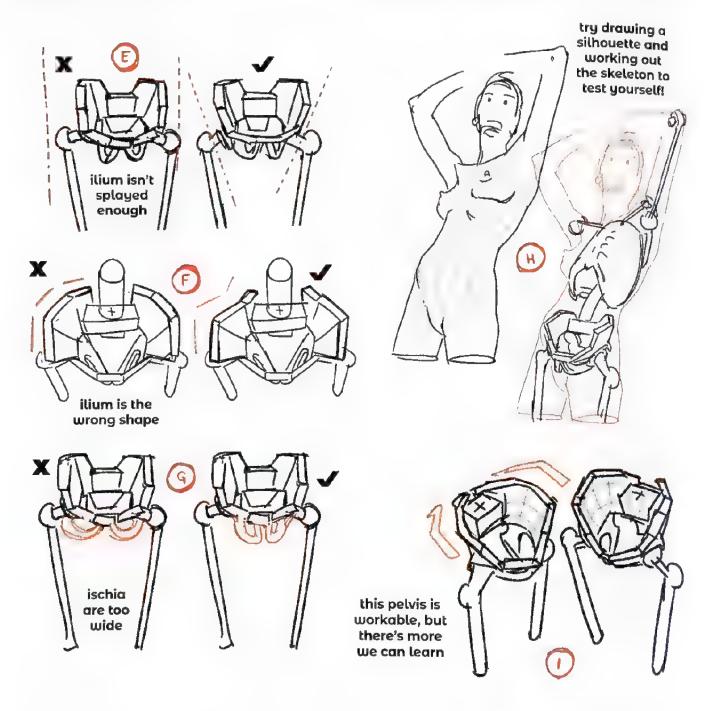


Don't stress about getting the form absolutely perfect You just need it to be correct enough that the muscles aren't deformed when you draw them on top Understanding the function behind the design is the most important part!

Some common mistakes include not splaying the ilium enough (E), giving the ilium a C shape rather than an S shape (F), and making the ischia too wide (G)

As with every stage of this book, constantly test yourself. You won't memorize this information by just looking at these drawings. Find photos or go life drawing, and draw the forms beneath. Drawing the silhouette and

then "bui ding out" from the skeleton is always a great test of your knowledge (H). The current state of our pelvis should look something like I, but we can streamline this design further

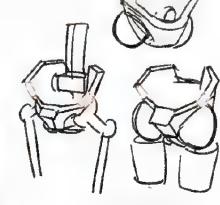


# streamlining a pelvis design

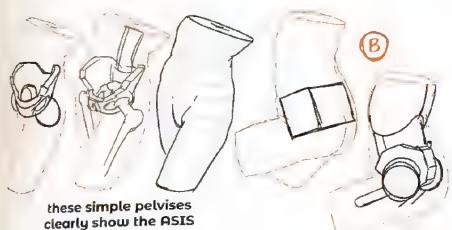
pere's a slightly simplified model variation. We want a shorthand for each form. Using a detailed drawing is no better than using a simple one with the same proportions — the silhouette is what's important! Identify the major

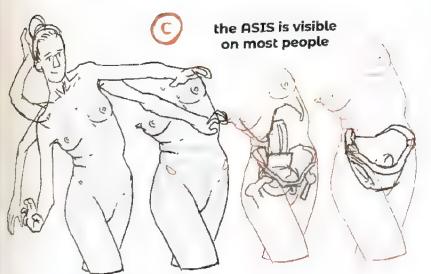
landmarks and use a shorthand design that shows those. Any level of detail is fine. First, let's review the landmarks. The tips of the iliac crest are called the ASIS, short for "anterior superior iliac spine" (A) Our design will

include the ASIS prominently, as well as the sacrum shape at the rear of the pelvis (B). The AS.S is visible on most people (C), particularly when the arms are raised, which lifts the obliques (D)



the ASIS (anterior superior iliac spine)



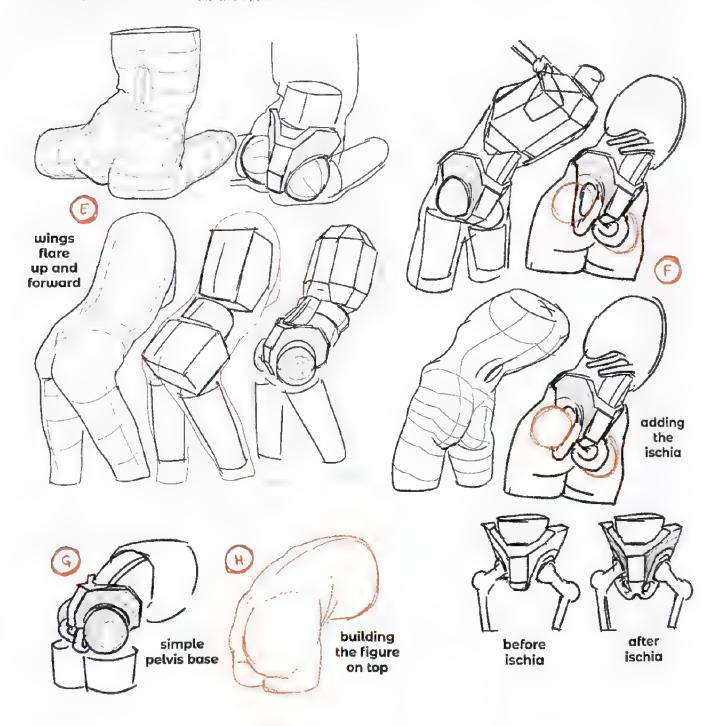




This simplified pelvis is very effective as a base for adding muscles because it incorporates the basic landmarks without adding too much detail

The important thing to note here is the angle. Notice how the "wings," which represent the illum, flare both upward and forward (E). This will be important

later, when we add the muscles. To this form, we can add the loops of the ischia to create a very practical pelvis shape (F) Figure H was drawn over the top of G and it's nicely believable, which is the best test!



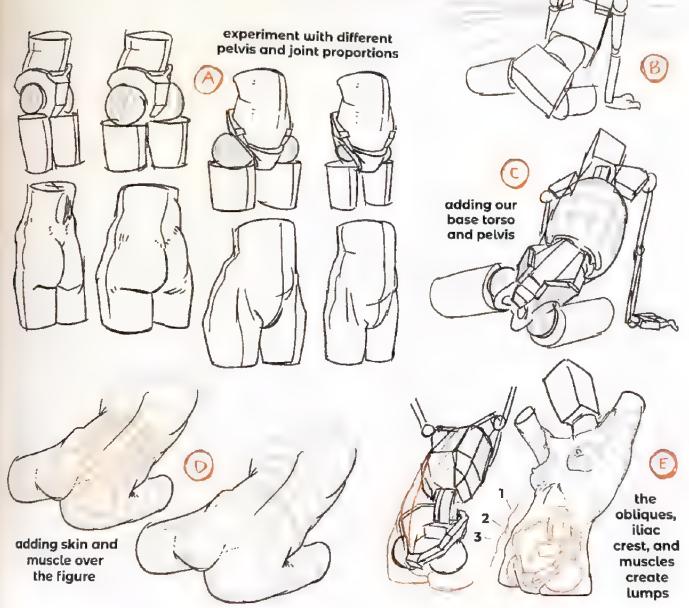
## tip: mannequin test

You can add ball joints or real joints to the underpants shape — It doesn't really matter. Try varying the ratio of the spheres' size to the pelvis to create different effects (A). These examples don't include the ischia, but you can add them for extra complexity.

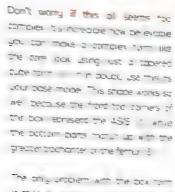
We can now test a pose with our box mannequin, ensuring the proportions and perspective are believable (B) Refine it by adding our more advanced chest and pelvic forms (C). Finally, draw the silhouette and use cross contours to check that the volumes

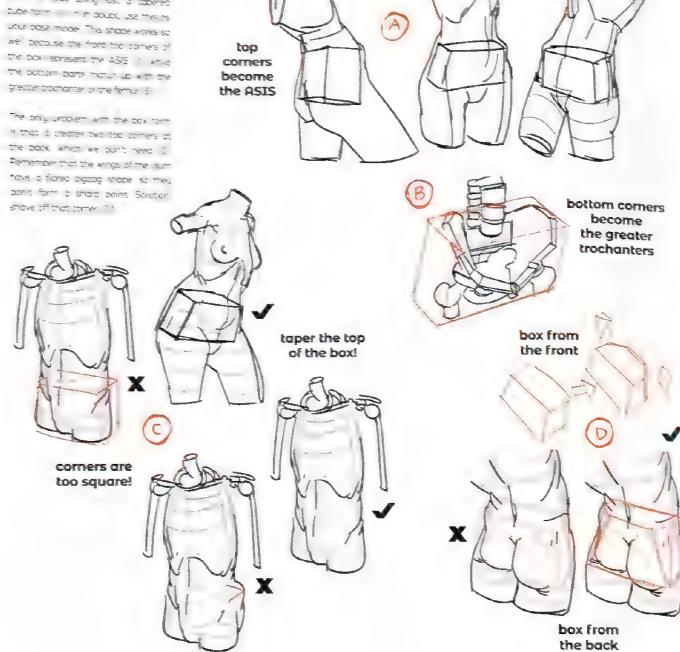
ore believable (D). If you're wondering what the lumps on D are, E breaks them down 1 indicates the obliques sitting on top of the illoc crest (the crest being the top of the "wings"), 2 is the illiac crest itself, and 3 is the muscles of the hip and leg

posed box mannequin



### simplified box pelvis





The widest part of the pelvic region is usually the greater trachanter of the femur (E) which makes it easy to place the bottom of our simplified box form The hips' location and tilt can be trickler. To help place them, draw a line

through the ASIS (the tips of the Iliac crest), to clarify the tilt and visualize the top of the box form (F)

We've learned that we can shave the back wedges off the box (G) Next,

we can add a little more taper to the sides, to take the width of the greater trochanters into account (H). It's common to see the iliac crest drawn quite prominently because arbsts use

it to construct a character's anatomy. However, we never actually see this because it's covered in fat and muscle. For realism, avoid drawing it.

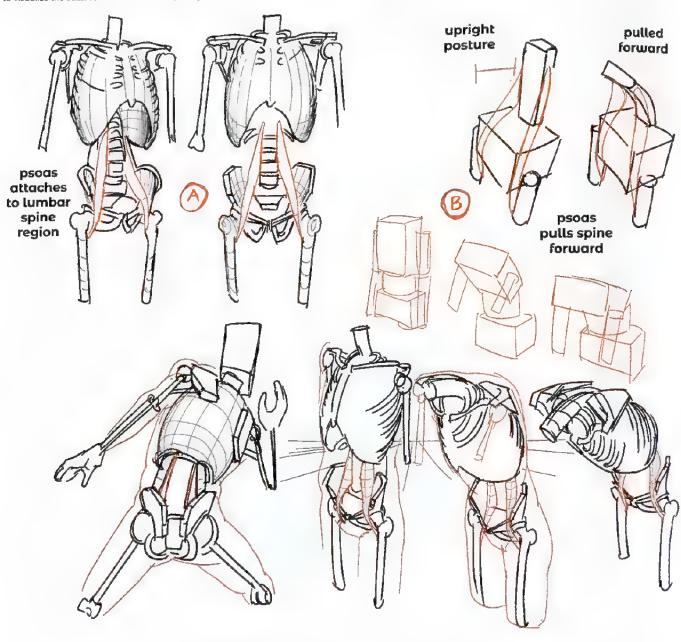


#### the psoas

People avoid learning the "deep" muscles because you don't see them superficially (from the surface). But if you don't understand how the body moves itself around, you won't be able to visualize the outer forms!

Always remember that muscles can only pull. There is no pushing action This simplifies things for artists, because we only need to ask, "What two parts of the body is this muscle pulling on?"

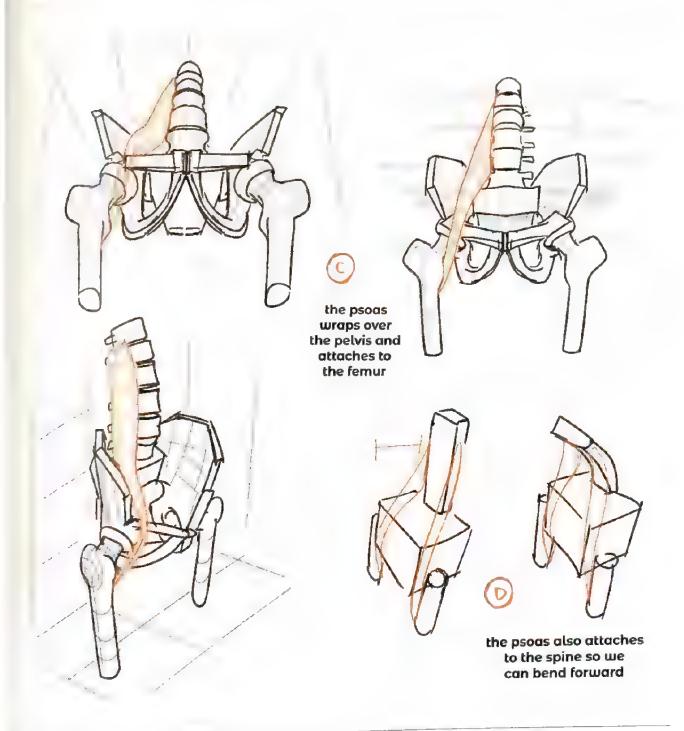
Focus on how something works, not how it looks. The psoas, for example, is a hidden but major muscle. It attaches mainly to the bottom five vertebrae of the spine (the "lumbar" region) (A), where it can pull our spine forward (B).



when memorizing muscles, always consider two factors. How far in consider two factors the attachments, front or behind are the attachments, and how far out to the sides are the attachments?

For example, the psoas wraps around the front of the pelvis and attaches into the rear of the ferriur (C). The other end attaches to the sides of the spine but this attachment is relatively forther

back than the attachment to the legs. This suggests that we are probably trying to pull the spine forward (D

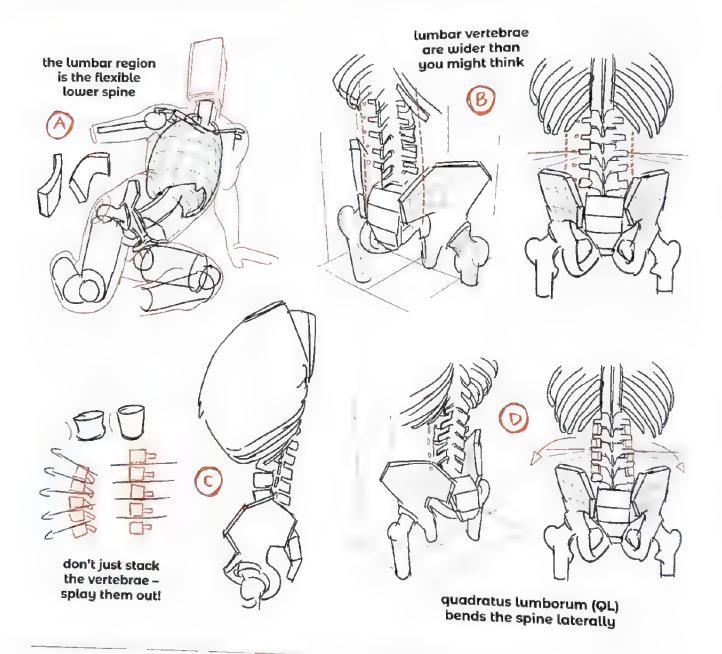


#### lumbar region

Let's quickly review the lumbar region of the spine (A). It connects the rib cage to the pelvis and consists of when drawing these vertebrae include a natural curve (C).

drawing them too narrow rather than at their surprising full width (B), and drawing them stacked on top of each five vertebrae. Common mistakes other rather than splaying them out in

The lateral projections of the vertebrae anchor the quadratus lumborum (or "QL"), a powerful chain of muscles that helps us bend left and right and provides stability to the spine (D)



to the deal for a lateral role

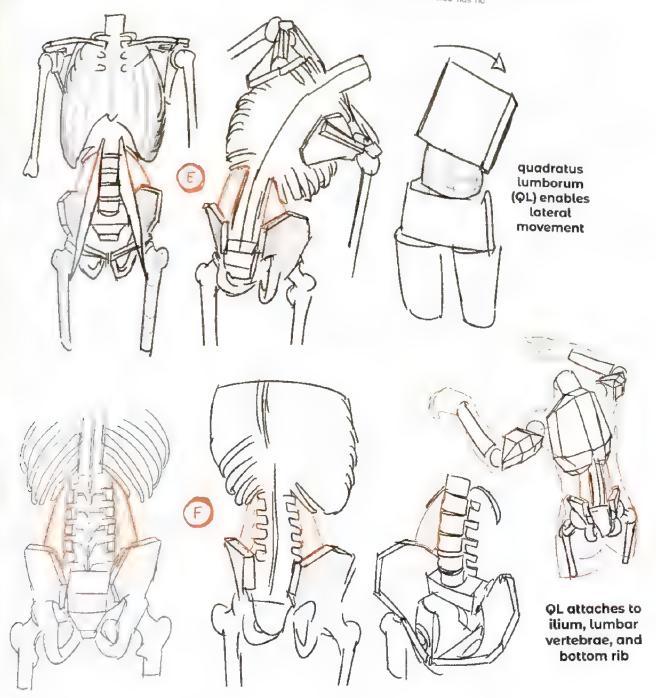
to not ideal for a lateral role

to not ideal for this (E) The

QL attaches to the back of the ilium (the wings) just above the sacrum (the shrimp-tail) and joins to the sides of the five lumbar vertebrae Crucially, it also attaches to the battom nb (F)

If you haven't noticed by now, the lumbar region of the spine is a weak place on the body There's nothing else joining the two large masses of the body together, and the area has no

bone of the front to support it. This is why we tend to suffer lower-back pain in evolutionary terms, we haven't fully evolved to walk upnight.



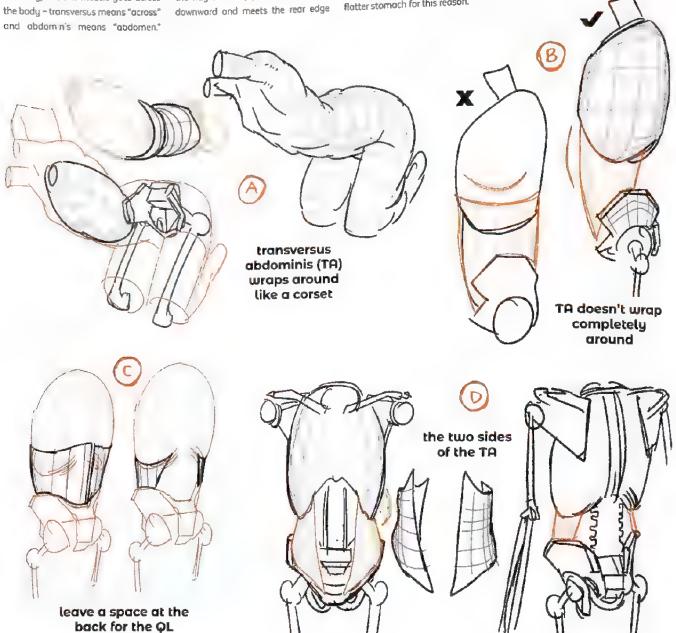
#### abdominal region

Now let's move on to the nearby transversus abdominis (or "TA"). Often we think of the core as running vertically, but this muscle goes across the body – transversus means "across" and abdomin's means "abdomen."

The TA holds everything in like a corset

(A). It isn't an equal height around
the rib cage and it doesn't wrap all
the way around (B). Instead, it curves
downward and meets the rear edge

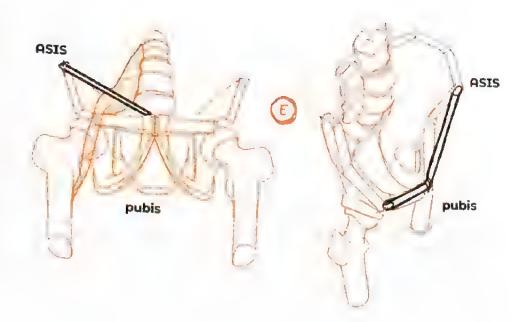
of the quadratus lumborum ("QL") at the back (C). Note the corset-like shape (D). People with a stronger TA generally have a narrower waist and flatter stomach for this reason.

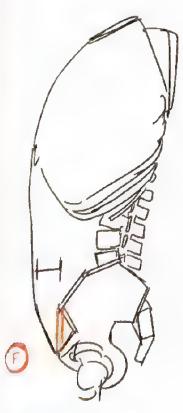


If you've wondering where these obdominal muscles attach, let's go we them now. We have a thick cord rated the inguinal ligament (E), which connects the ASIS with the pubis

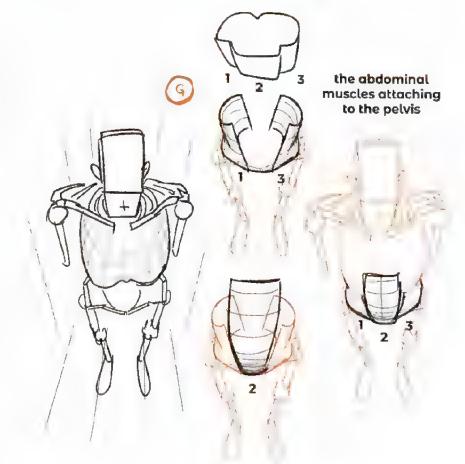
This figurent is almost exactly vertical when viewed in profile It's a good recouring point because most of the time the abdominal muscles extend forther forward than this ligament (F)

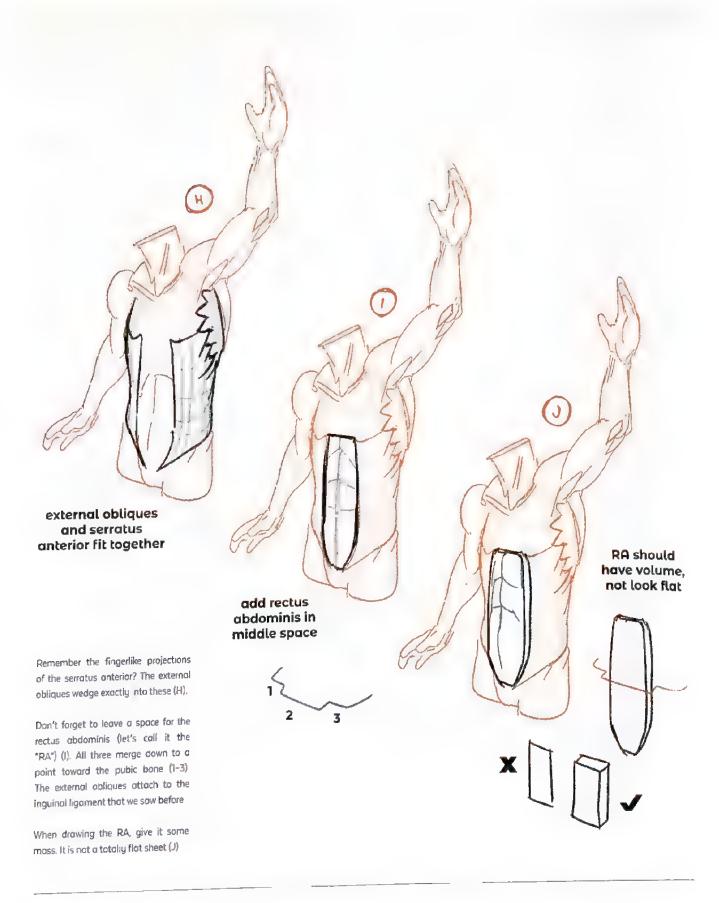
Viewed from above in G, the torso will namally show the external oblique muscles at the sides (1, 3). We can also see the rectus abdominus (the "sixpock" or "abs" muscle group) because a attaches to the front of the torso, just above the bottom of the sternum (2).





inguinal ligament from profile view



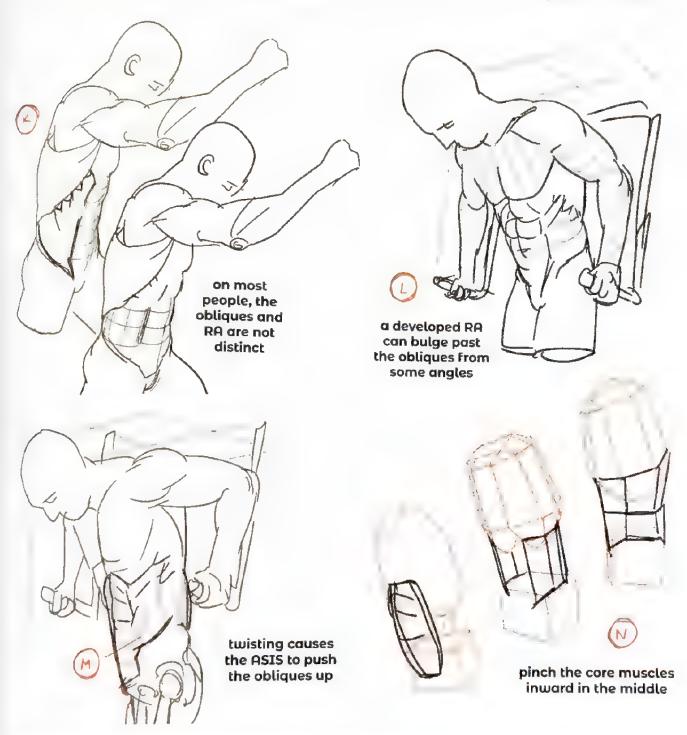


The more muscular and tean an advidua, the more clearly defined the line between the external obliques and the RAWhibe (K). For most people,

there will be a most no distinction between them. When the RA is more developed, the forms bulge out enough that the external obliques are

sometimes hidden in a three-quarter view (L). When we twist the core, the ASIS pushes the external obliques upward, causing a bulge (M)

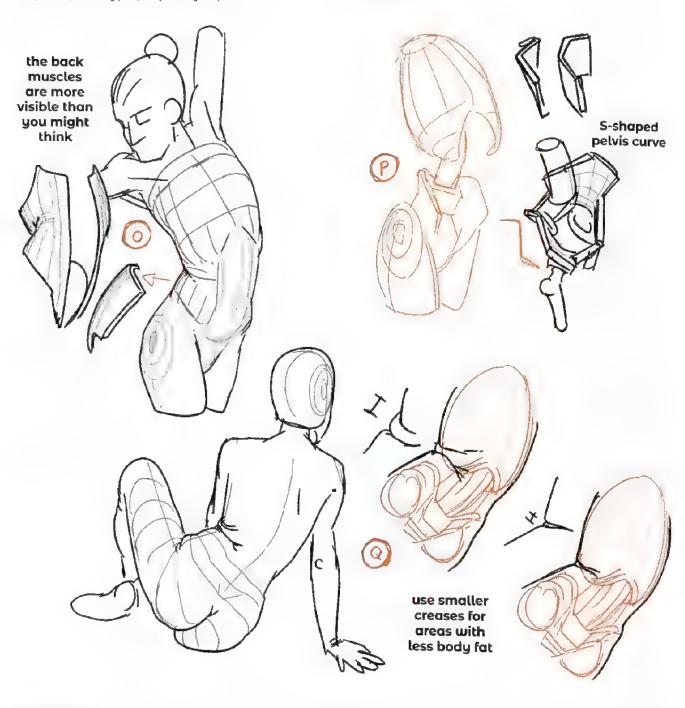
When drawing the core, give it three distinct sides, like our nb cage form. To make it more complicated, add the inward pinch at the middle (N)



When you draw the figure twisting, the obliques cover not only the side of the body, but the rear of the waist too. They run around the sides to the back. You usually see more of the back than you'd expect in any pose, except

from a completely frontal view (O). Note the space (P) where the S-shape of the pelvis allows us to see more of the obliques and gluteal muscles (the "glutes" or buttocks) than you might expect

Indicating body fat doesn't require adding huge amounts of mass to the figure. The difference can be shown in the depth of the folds – simply draw smaller creases to indicate areas with lower body fat (Q).



## tip: add some twist!

"Mai possible, always include a bwist a year poses—this will add variety and believability (A). The two relative and believable in the ASIS (I) and the bottom corners of the rib cage.

(I) As these two points move closer tracker, the muscle in-between has to postarchere - it bulges outward (B).

the corners of the rib cage and ASIS can move closer together

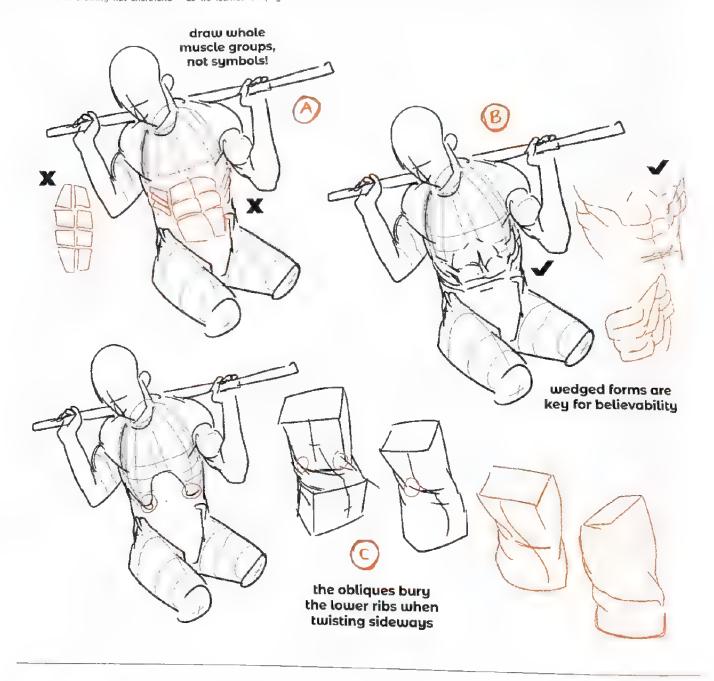
twist your figures to make them more real and interesting! muscle bulges out when the body bends

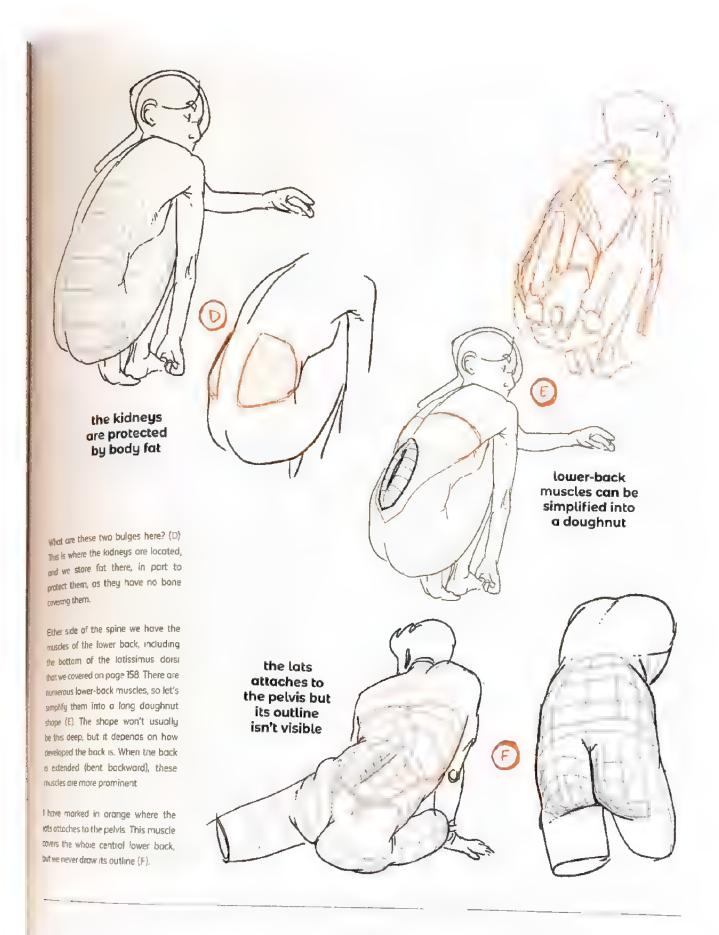
### tip: hidden muscles

When drawing the core, as with all muscles, remember not to separate the groups. It's tempting to fall into the habit of drawing flat shorthand

symbols instead of how the subject that what creates form is wedging, as we learned on page 28. Even if

the anatomy isn't quite correct, if it actually appears (A) Remember "wedges" believably it will appear more like it is (B) When the rib cage twists, its front corners are buried by the obliques. It is important to show plenty of over aphere. Practice drawing simple forms until you are comfortable with this type of twisting (C)





## proportions & gender

So much of our recognition of gender is based upon characteristics such as proportion and musculature. If you see a figure like this (A), it is difficult to define the character's gender because the proportions are mixed

Key characteristics for women can include wider hips and a smaller rib cage relative to the pelvis. Less essential characteristics would be features like hairstyle, breasts, and genitals, which we don't rely on much for identification in our drawings

Narrowing the hips makes this figure look more "masculine" (B). Conversely, adding body fat around the waist gives a more feminine appearance (C), as women have a higher body-fat ratio

on average. Above the public mound we have a region where stomach fat accumulates



ambiguous proportions



more masculine proportions



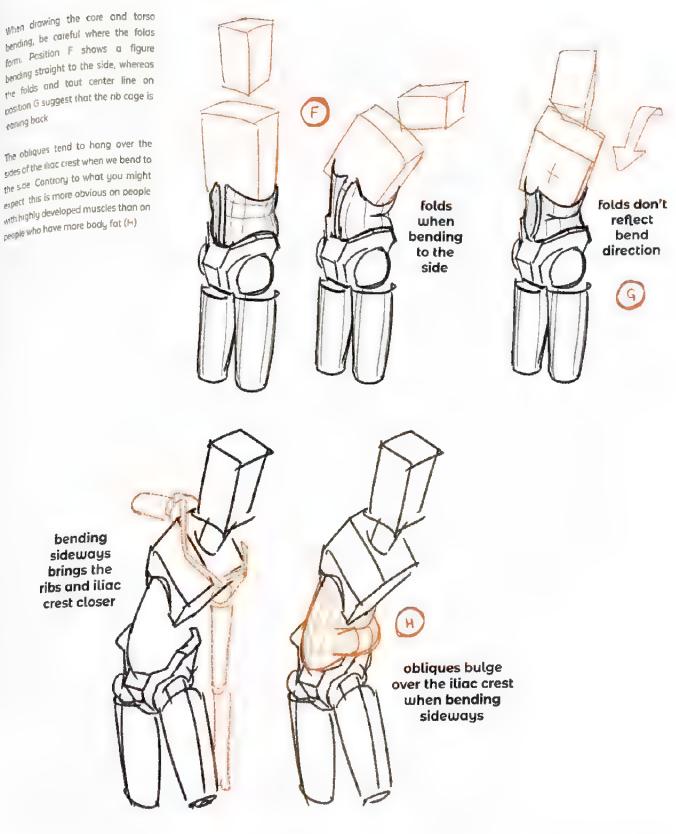
more feminine proportions





bending, be careful where the folds form. Position F shows a figure bending straight to the side, whereas the folds and tout center line on position G suggest that the nb cage is eaning back

sides of the iliac crest when we bend to the side Contrary to what you might expect this is more obvious on people with highly developed muscles than on



obliques and stomach-fat region with the same rhythm as nineties-style waist wrapping around Frequently, this fat pad will cover the far side of



#### core summary

We've learned that the core is a surprisingly complex, nuanced area of the body, and how a successful core thinges on a good understanding of the rib coge, spine, and pelvis

We comed about the functions and landmarks of the pelvis, and how to streamline its shape into something more suitable for our mannequin (A)

We explored the muscles and forms that form the core, including the deep muscles that allow us to twist and bend - even if we can't see them from the surface - and the soft tissue and fatthat cushio - \* 'awer torso (B)

Next, we'll be continuing the journey from the pelvision of tops of the femurs, of the way down the legs to the feet!

building up layers of muscle and fat to give the core form



## lesson 5: legs feet

Now let's examine everything below the core, including the bones of the legs and feet, the key muscle groups, and the simplified forms suitable for our box mannequin.

### leg bone overview

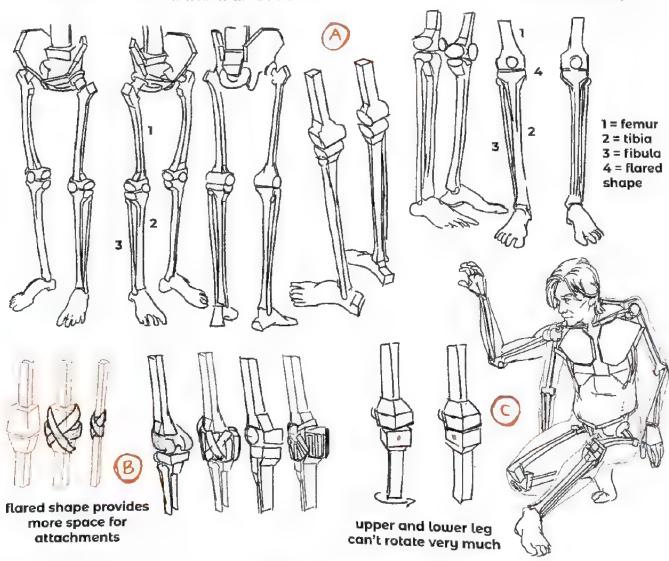
The number of bones in the egs matches the number of bones in the arms: one for the upper section and two for the lawer (A). The upper bone, the femur (1), is extremely strong. The tibia (2) and fibula (3) are the lower two bones. The tibia is weight-bearing while the fibula is thinner and plays a more auxiliary role, just like the ulna and radius of the arm

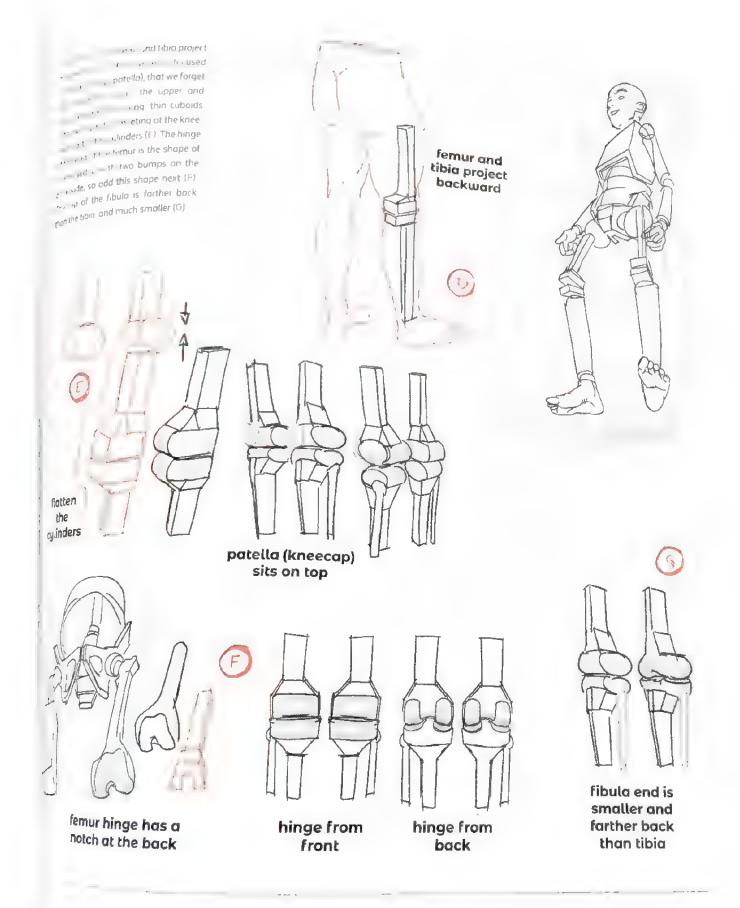
When simplifying the leg, draw rectangles rather than cy inders, as this helps you control the XYZ rotation of your shapes

At the knee end of each section, we see that the shape of the bones flores out (4). Why is this region so large? Why does it bulge out wider than the bones themselves? The answer is that

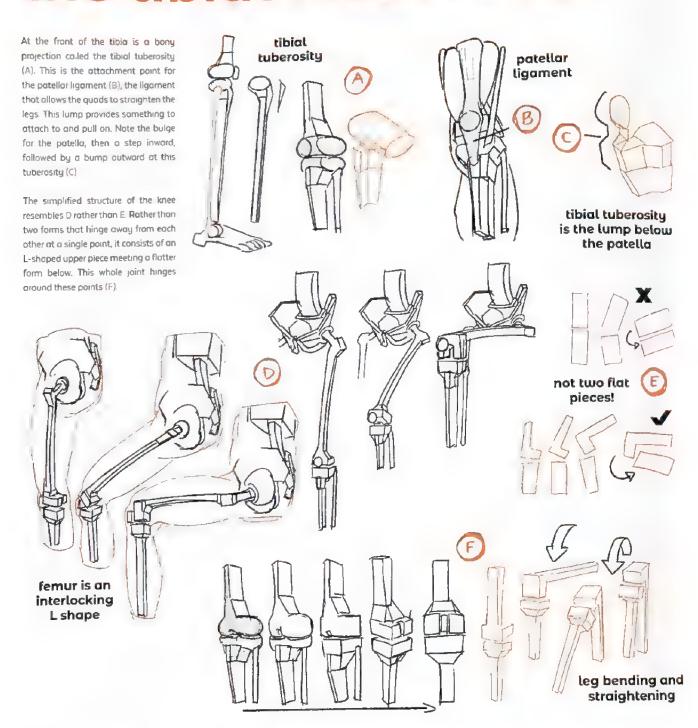
we have many tendons and ligaments attaching the leg bones and muscles together—if this area was smaller, it would be weaker, with less room for attachments (B)! Because of this large amount of connective tissue, the upper and lower legs have very I tile scope to rotate independently (C)

leg bones widen toward the knee





# the tibial tuberosity





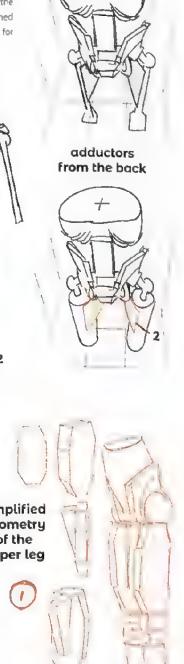
The second role of the adductors is to assist in bringing the legs up and forward (flexion). Because they primarily attach to the rear of the femur, they work together with the psoas (F) and liacus (G) to assist in flexion of the leg. The psoas, as we learned on page 244, is a long muscle that wrops over the ilium, and the

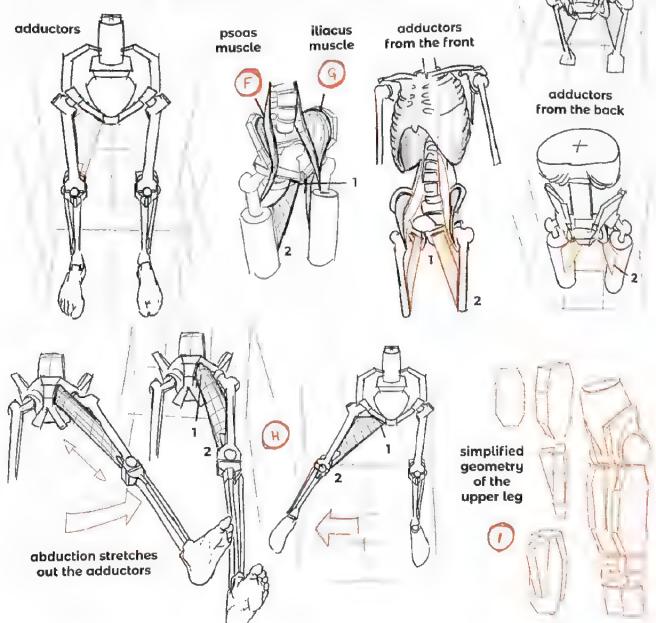
fliacus is a flat muscle that covers in the inside of the wings of the illum

When we move our legs out to the side (abduction), our adductors must lengthen (H). When we raise our leg forward (flexion), the action is facilitated by the relative positions of the muscle attachments. Point 1 is

forther forward than point 2 on the back of the femur, so the adductors can pull the leg forward

If we're increasing our mannequin's level of detail, we can simplify the upper leg into a long, flottened octagon with a triangular wedge for the adductors (I)





gluteal muscles

The muscle attachments to the top of the femur are similar to those of the shoulder joint (A), almost like the head of a joystick. Muscles radiate out from the greater trochanter (B), the small projection at the top of the femur, like they do to the top of the humerus in the orm. The gluteus minimus is one of three gluteal muscles ("glutes"). It ottaches to the front of the greater trochanter, along with some other small muscles that we don't need to

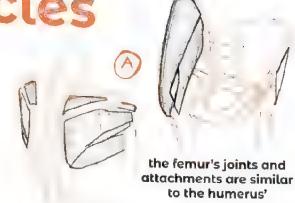
gluteus

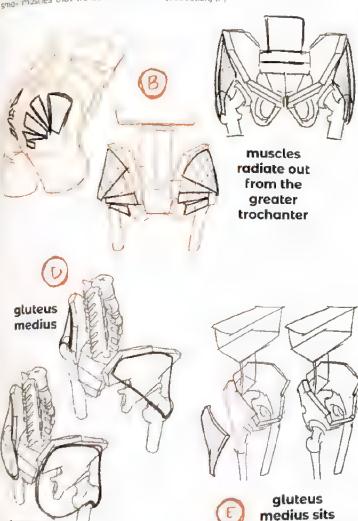
maximus

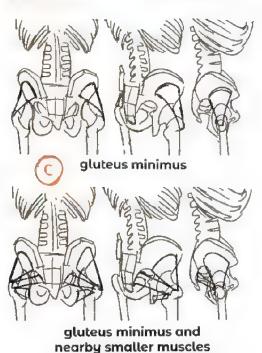
know in detail (C). The gluteus medius covers it almost completely and attaches farther out to the side. The gluteus maximus covers that and is even larger (D)!

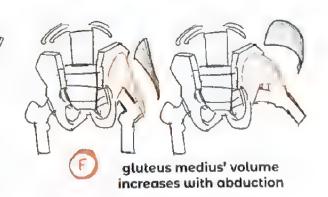
The gluteus medius is located on the sides, and is thin at the rear of the pelvis. Viewed from above, it hangs closely to the ilium (E). It bulges when the leg is raised to the sides (abduction) (F)

close to ilium



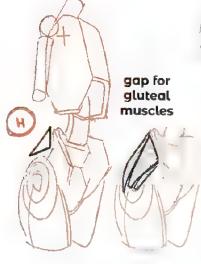


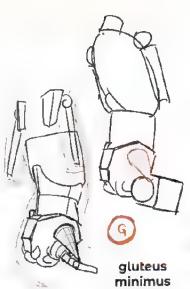


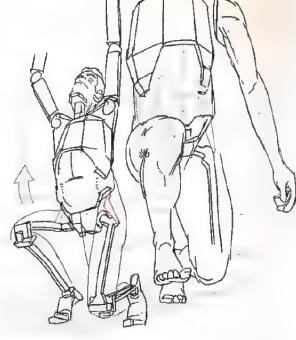


The gluteus minimus assists in raising the leg due to its slight forward attachment (G). When viewed from the front, there is a space on the pelvis that is filled by the gluteal muscles (H).

The gluteus maximus attaches to the sacrum and rear section of the ilium (i) It runs both outward and down, and ends in two places (J) the outer femur (1) and the iliotibial tract (or "IT band") (2), which we'll cover shortly







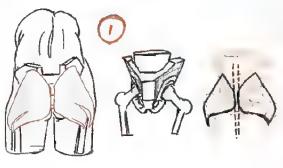


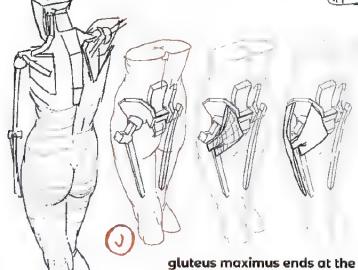
outer femur and IT band

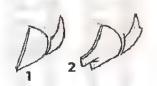
helps raise

the leg

forward







1 = outer femur 2 = IT band

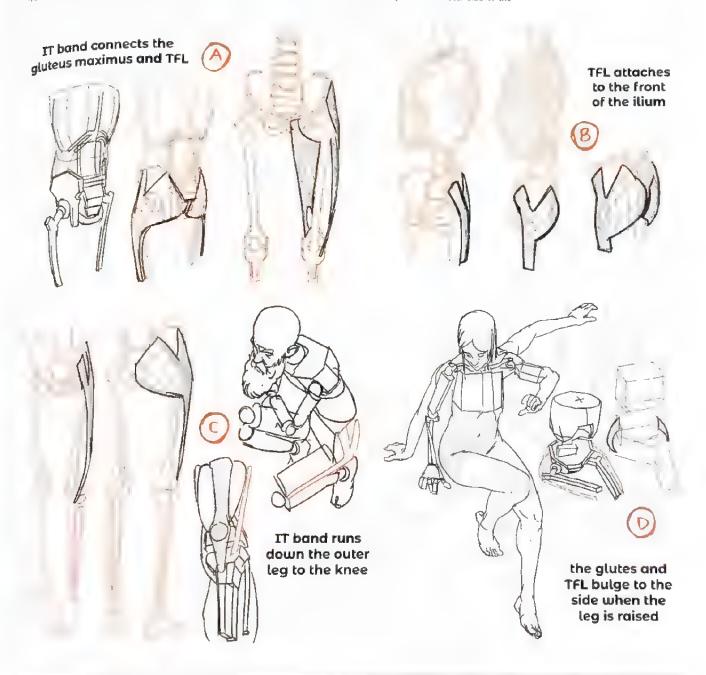
# the TFL and IT band

The tensor fasciae latae, or TFL, is a smaller muscle at the front of the thigh that works in tandem with the gluteus maximus to help us walk and balance the TFL and gluteus maximus ore

connected by the iliotibial tract, also known as the iliotibial band or IT band, forming a kind of Y shape (A) The TFL attaches to the outer front of the ilium just behind the ASIS (the tip of the

Iliac crest) (B). Together, the TFL and gluteus maximus lie on top of the other glutes. The IT band runs down the side of the leg, connecting to the front of the tibla just to the outer side of the

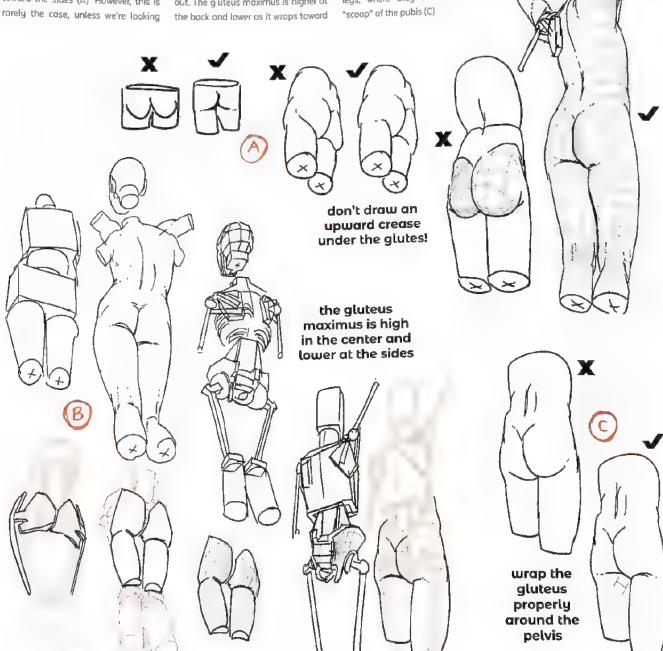
patella (C) When the legs are raised the glutes and TFL will usually form a bulge on the outer leg (D)



# tip: believable glutes

Artists often draw the creases under the gluteal muscles with an upward angle toward the sides (A) However, this is rarely the case, unless we're looking

at the figure from above! Instead, note the angling downward from inside to out. The gluteus maximus is higher at the back and lower as it wraps toward the front (B). The glutes are visible from most angles, even between the legs, where they connect with the "scoop" of the pubis (C)



### the quads

Let's continue down the leg, simplifying the dome of the patella into a flottened cuboid form (A) for this next stage

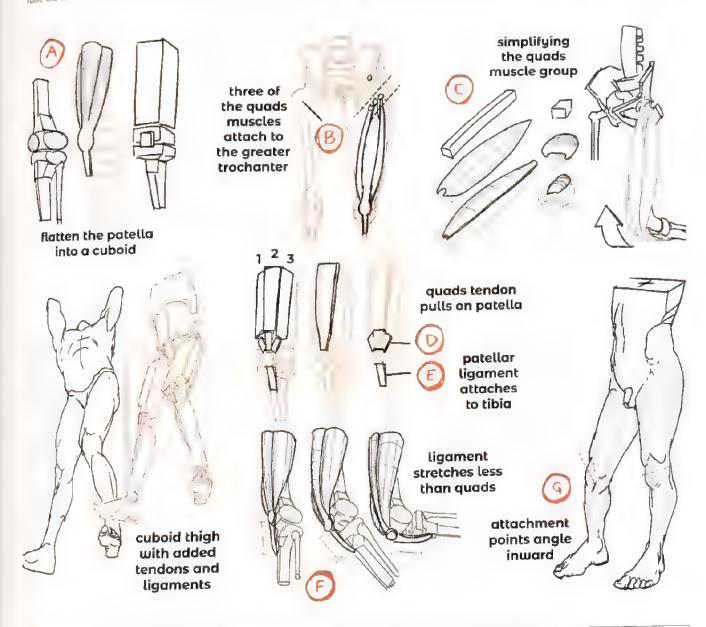
On the front of the upper leg, the quadriceps femoris muscle, or quads, is a group of four muscles that both raise the knee and straighten the leg

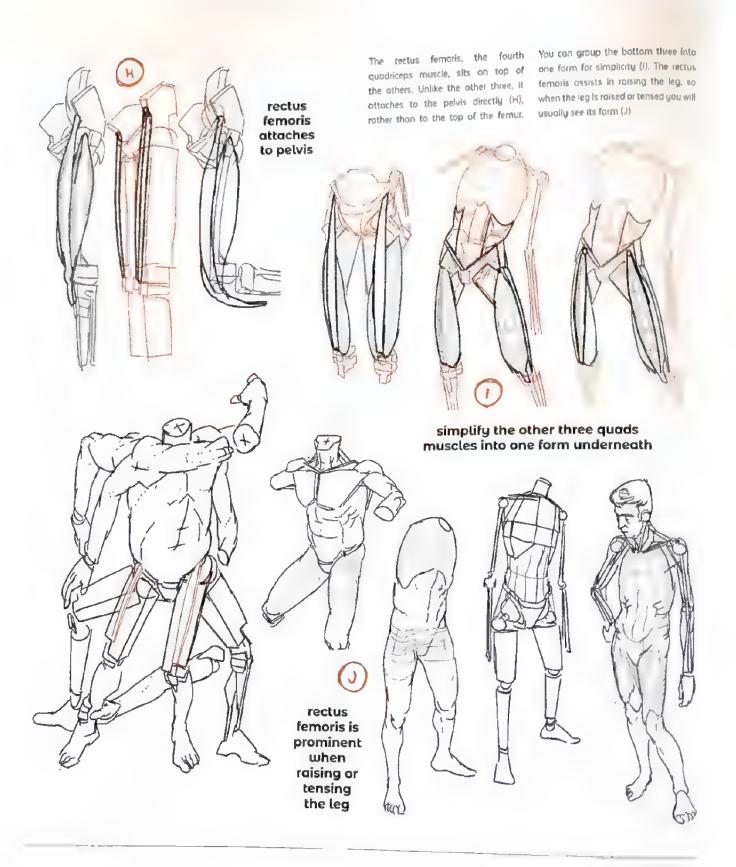
We can visualize them as a long, leafshaped form wrapping over the cuboid of the femur, with a narrower strip on top (B

The bottom three muscles of the quads sit on the front-facing surface of the femur and attach at the top

near the greater trachanter (C). They pull directly on the patel a via the quadriceps tendon (D). The patella is attached to the tibia below via the patellar ligoment (E). When the leg bends, the tendon of the quads stretches the most (F), while the patellar ligoment is less elastic

The attachment points for the bottom three quads muscles angle down toward the midline of the body (G). From inside to out, we have the attachments for the vastus medialis muscle (1), the vastus intermedius (2), and the vastus lateralis (3) (meaning "inner," "middle," and "outer").

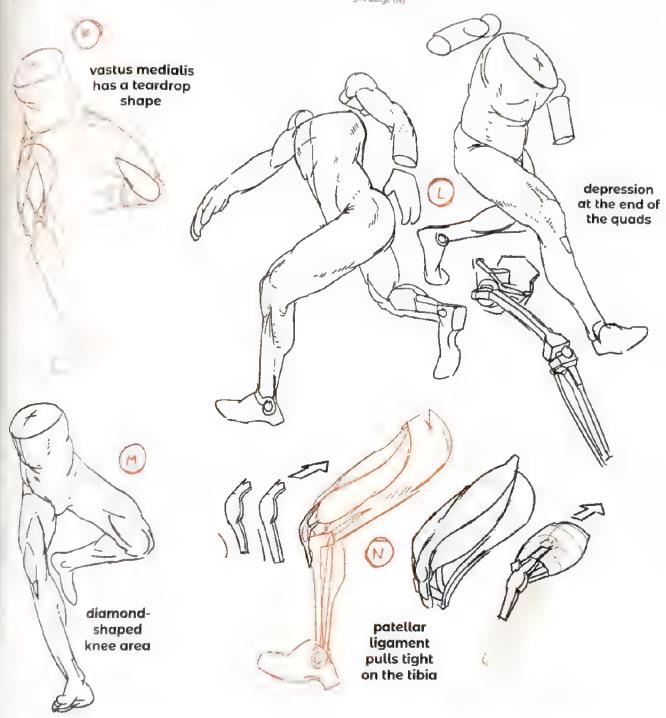




However you draw the leg, add a stadiop shape for the vastus medial (inner) in which is the most medial (inner) in which is the most medial (inner) in which is the most medial (inner) and twist to the forms of the legi

Not a sly wid we see a teardrop shape, but frequently when the leg is roised we will see a slight depression between the ends of the quads (L). But if the patella is round, why do we see a

diamondlike shape here (M)? When the quads pull on the patella, the patellar ligament that connects the kneecap to the tibia is pulled tight, which causes a slight bulge (N)



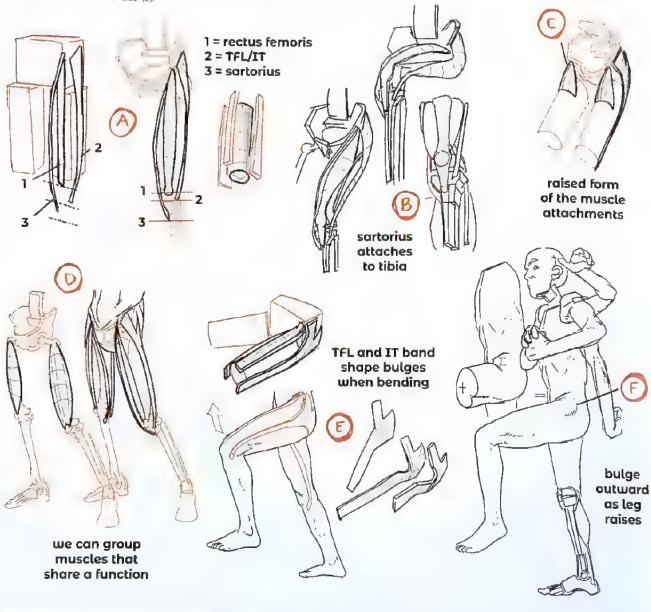
# grouping leg muscles

To learn muscles more easily, group them by function. We've already grouped the lower three quads; let's add another group on top of them (A). This group consists of the rectus femoris at the front (1), TFL and IT band on the outer side (2). and sartonus on the inner side (3).

They each end at different heights. above the rectus fernoris, while the bottom attaches just inside the tib al tuberosity (B) When drawing a raised leg, include a raised area to show where these muscles attach (C)

We can group muscles together The top of the sartorius attaches just — because they fulfill a shared function for example, the bottom three quads muscles straighten the leg, and this second trio raises the leg (D). When the leg is raised the form of the TFL and T band is bent. Don't make it a flat

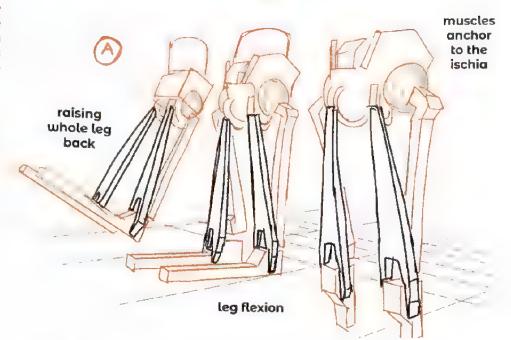
shape - imagine how that Y-shaped form would bulge out if forced to bend (E). There should be a small distance between the ASIS and the top of the leg. Note the bulge outward that was just mentioned (F)

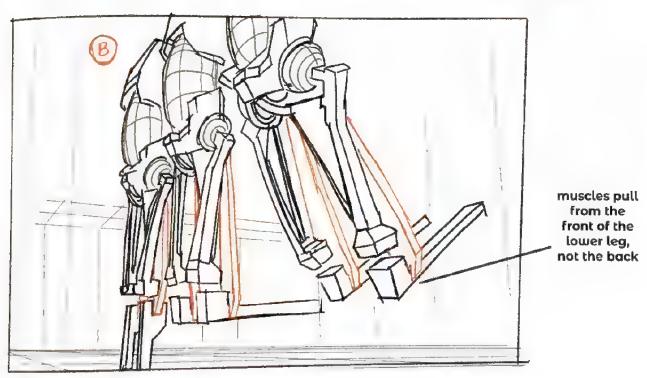


# back of the thigh

Let's consider the function of the muscles of the rear upper leg. These muscles are required to bend the leg at the knee, raising the foot behind us (flexion). They must also pull the whole leg back behind us (A).

To achieve these functions, it's more efficient for them to attach to the lower leg at the sides and front rather than at the rear (B)

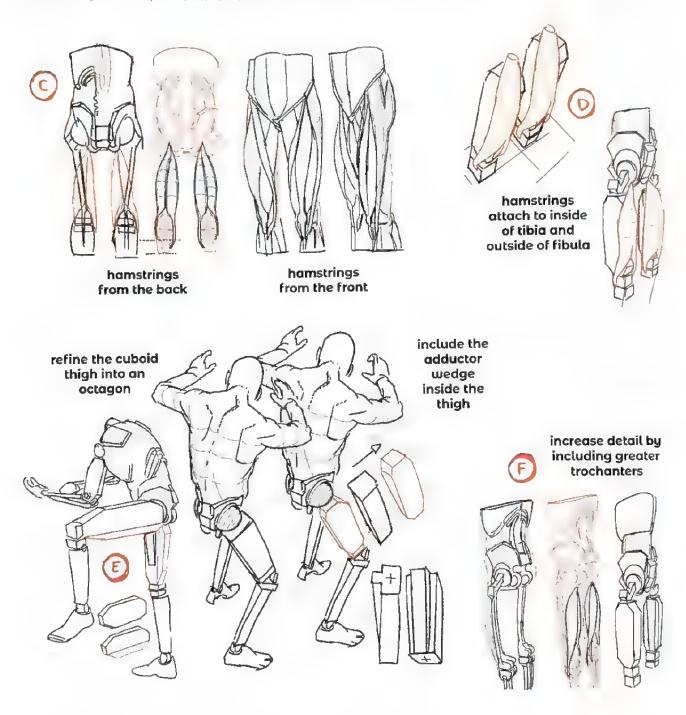




The homstring muscle group forms the back of the thigh (C). This group attaches to the front of the tibia on the inside of the leg, and to the top of

the fibula on the outside (D) Earlier we made a cuboid form for the upper thigh with a flot wedge on the inside for the adductor muscles. Now let's

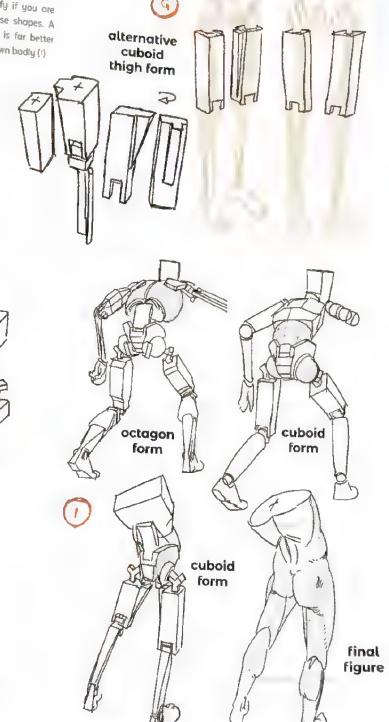
make that into an actagonal shape, still including the inner wedge for the adductor group (E). If you want to push for a slight y higher level of detail, you can include the greater trochanter of the fernur, too (F). Notice how the octagonal thigh shape ends in the flattened cube form for the knee



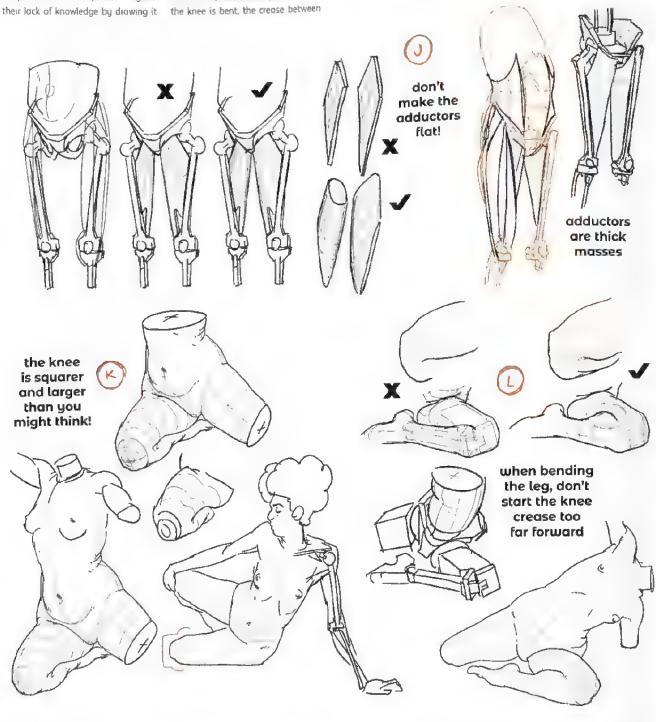


and a notch to create a hinge for the knee (H). At this point our mannequin is becoming increasingly detailed, so make sure to simplify if you are struggling to rotate these shapes. A simple form drawn well is far better than a complex form drawn badly (1)

notch around the knee



When drawing the adductors, give them mass and depth (J). Draw the knee squarer and wider than you think People often attempt to disguise their lack of knowledge by drawing it smaller, but this just draws attention to problems in the area. The forms should bulge out at the sides. If in doubt, draw the knee squarer and larger (k.) When the knee is bent, the crease between the legs won't extend as for forward as you'd think. Give the bones of the legs space to form a cubelike shape at the end, then start the fold further back (L)

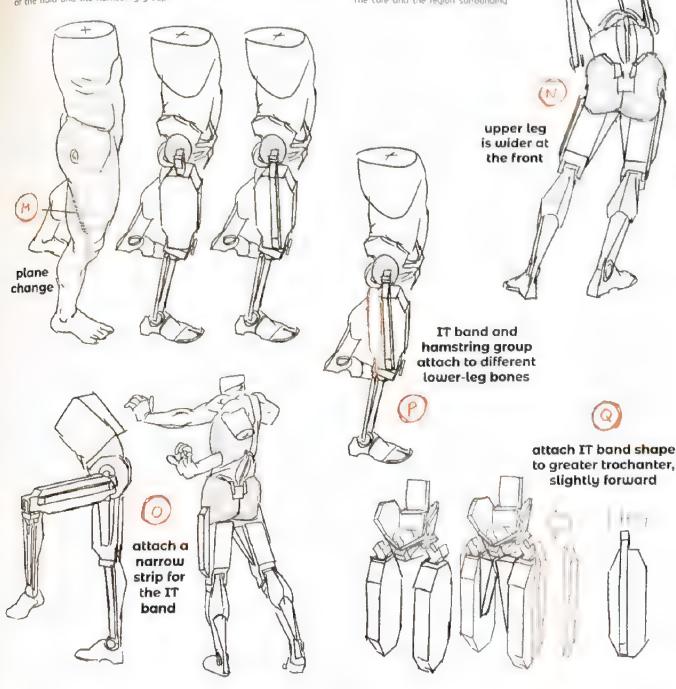


This visible landmark is the step down where the IT band meets the hamstring group (M. The upper leg is wider at the front than at the rear (N). Let's add the IT band to our model (O). Remember that the IT band inserts into the front of the tibia and the hamstring group.

inserts into the top of the fibula (P). On our model, the IT band attaches to the greater trochanter (Q). Note how this narrow strip doesn't sit directly down the center of the outer thigh, but slightly forward.

Remember that there is no single hard surface model we can use for all poses because the body is flexible. So how do we design an effect ve incide? We have rely primarily on hard surface forms and still include regions of flexibility. The core and the region surrounding

the pelvis are two of these particularly flexible areas. If you can draw the hard forms accurately, and you know the muscles, attachment points, then you can design almost any body type.

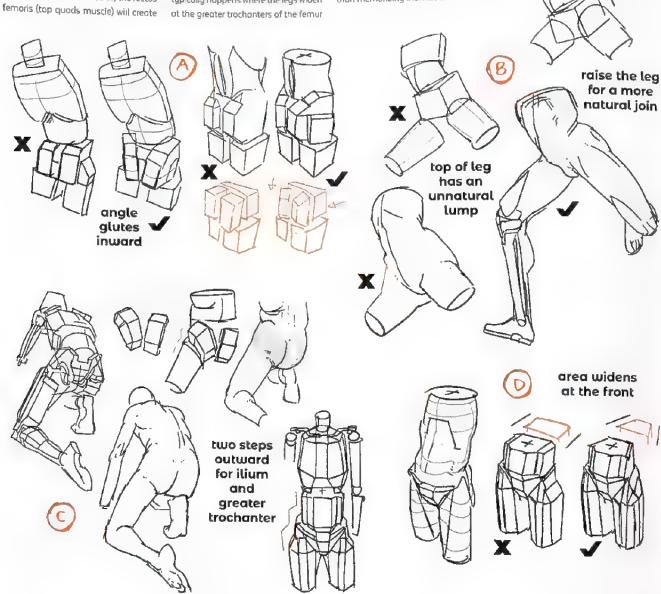


# tip: common mistakes

A common mistake is to draw the "arches" of the glutes parallel, instead, angle them inward (A) Be careful to attach the legs high enough on the pelvis. If we simply draw the pevis black and then add musc es, the rectus

legs to avoid the appearance of a very long pelvis (B). Note the outward two tiers as we move down the body. The first occurs at the Ilium and the second typ colly hoppens where the legs widen

an unnatural lump! Instead, raise the (C). Also note the general widening as we move from the rear to the front of the pelvic and upper-leg region (D) These mojor rhythms are important to remember - much more important than memorizing individual muscles.



space between the patella and the like F, where the patella slides are tike F, where the patella slides are tike F, where the patella slides are and occupies that space

When the leg is bent, the patella isn't located on the top of it. The wide, flat surface we see is the bottom of the fernur, covered by the tendons of the quads (G). When we see a pose where

the feet are angled autward, remember that the rotal halo relates at the hip joint not at the knee. The ankle allows for some rotation, but less than you might assume (H)!

When drawing the folds in the bent leg, keep them subtle. The form is fairly solid, soit won't have multiple lines like fabric (I) Instead, suggest a delicate builging near the line itself.



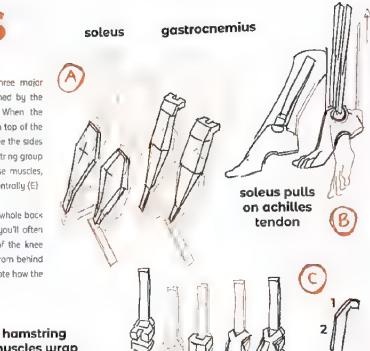
### the calves

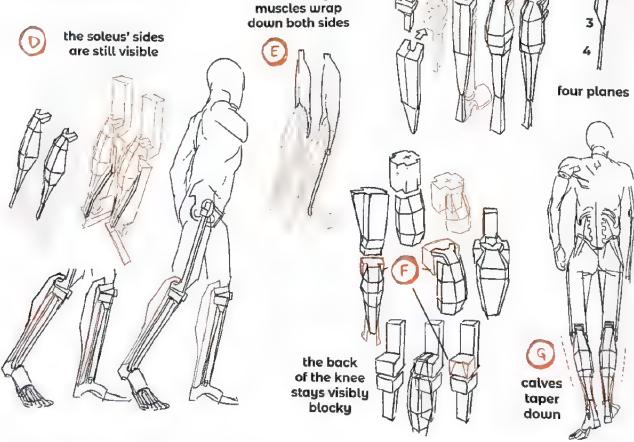
When we say "the calf," we refer to a group of two muscles — the so eus and gastrocnemius (A). The soleus is mostly hidden below the gastrocnemius. It attaches to the back of the tibia and fibula, and pulls on the Achilles tendon (or "calcaneal tendon"), which causes the foot to push against the ground—useful for jumping and wolking (B)

If you look closer at A, you'll see the soleus doesn't attach to the upper leg, but the gastrocnemius does. The gastrocnem us attaches into the bottom of the femur, above the backward projections at the end of the bone. It pulls on the Achilles tendon and also helps raise the lower leg.

The gastrocnemius has three major planes, with a fourth formed by the Achilles tendon (C, 1–4). When the gastrocnemius is placed on top of the soleus, note that we still see the sides of the soleus (D). The hamstring group wraps to the sides of these muscles, which is why they attach centrally (E)

The calves don't cover the whole back of the knee structure, so you'll often see the exposed "block" of the knee when the viewing the leg from behind (F). Viewed from behind, note how the calves toper down (G)





But if we have a space between the hamstrings and the calves, why don't we see a depression like in H? The unswer is the popliteal fat pad, one of

the fatty tissue areas that cushions the knee area. (1) When we stroighten our eg, this fot pad bulges out. When the eg is portially bent, the pad is covered.

by the bulging hamstrings—when the leg is neorily fully bent, the forms of the hamstrings visibly bulge out to the sides of



### leg extensors

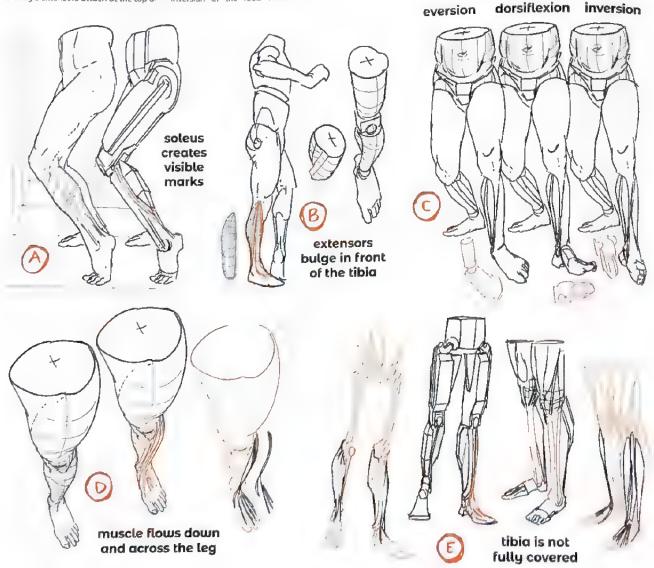
What are these almost parallel marks shown in A? These indicate where the soleus appears beneath the gastroanemius, with the extensor muscles in front of them

Just as the arm's extensors attach at the top of the outer bone (the radius), the leg's extensors attach at the top of the outer bone (the fibula). The mass of the extensors causes a bulge that projects forward of the tibia when viewed in profile (8)

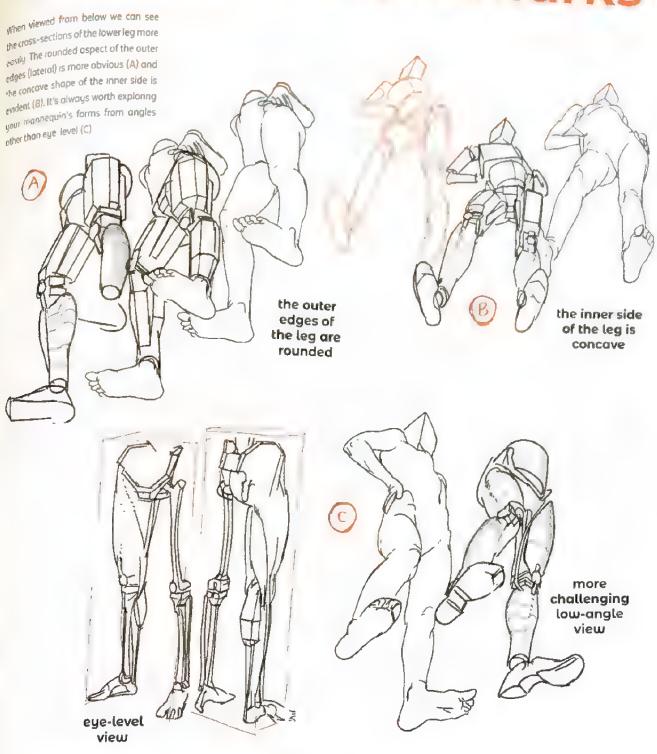
But what do the leg's extensors actually do? There are three main things (C): eversion, dorsiflexion, and inversion of the foot. These mean

twisting outward, bending back, and twisting inward, respectively

Note the flow of the muscle from outside in, and how it crosses the front of the shin (D). Also note the exposed section of the tibia, which you can feel on your own legs (E).



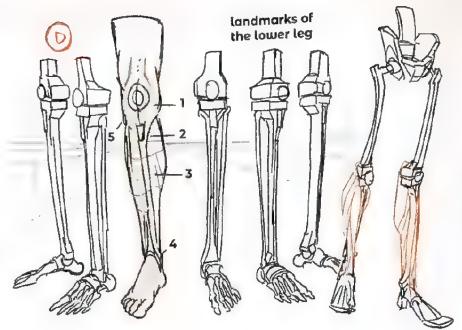
# leg forms & landmarks

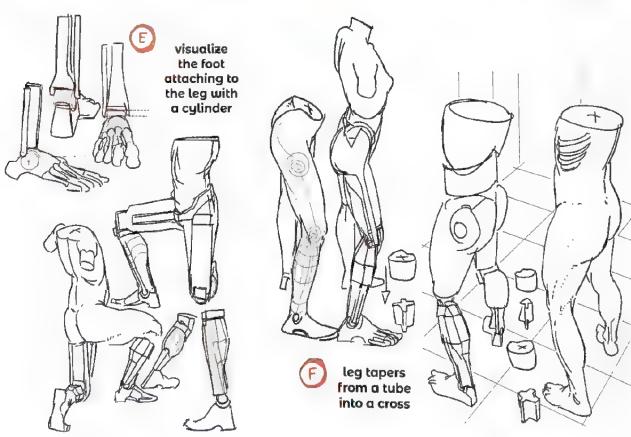


Always search for the obvious landmarks in your figure drawings (D) Some examples are the patella (1), tib-al tuberosity (2), exposed inner edge of the tibio (3), the inner (medial) ankle (4), and frequently the top sections of the fibula (5)

The foot is attached to the ower leg by the equivalent of a cylinder (E). The end of the fibulo is both farther back and lower than the end of the tibia.

As the lower leg tapers down, its crosssection becomes less like a tube and more like a cross (F). The outer sides of the cross represent the exposed bones of the ank e and the tendons of the extensors. The front side is the forward edges of the tibia and the rear is the Achilles tendon.





# starting the foot

the tibia and fibula don't finish

level

To draw the foot, start with a flat block that is attached to the lower reg with a sphere Give it some height – the foot is usually taller than you think (A). Shift the whole block backward, so it doesn't hinge from the very rear (B). The ankle joint is a hinge around which the foot pivots, and the ininge wouldn't work if there was nothing behind this point to act as an anchoi

The bottoms of the tibia and fibula grent level. The tibig projects down on the inside, and the fibula attaches further down the ankle (C) The feet also naturally spread slightly outward from the center line of the body (D) start with a flat block, then give it height move the block to make a heel



the feet angle

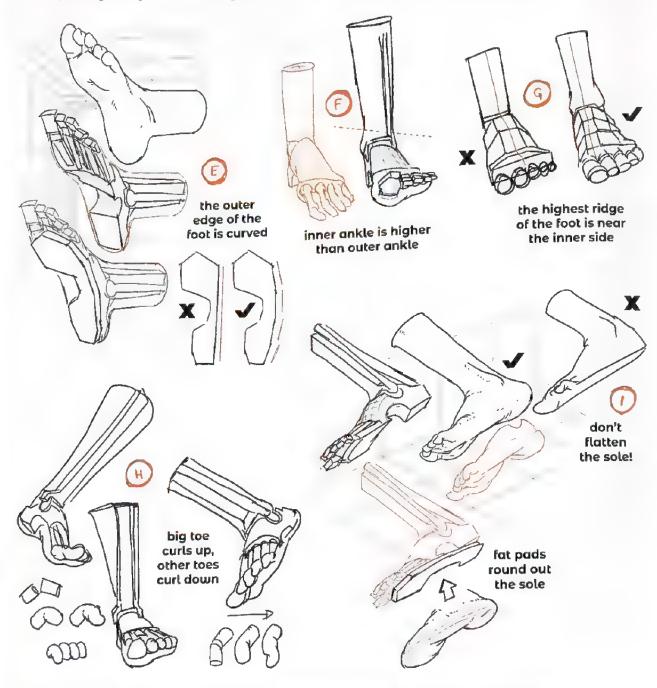
slightly outward

Note the outside of the foot isn't stroight, but curves delicately (F). The inner section of the ankle is higher than the outer (F). The highest "ridge" on — con use two cylinders as the basis for

the top of the foot doesn't run down the center, but is located between the big toe and the second toe (G) You

each toe, but note that the big toe curls upward at the tip, while the other toes curl down even when raised (H) Be coreful not to end your soles too

obruptly - round off the edges rather than slicing them flat. The fat pads on the bottom of the foot are thick (I)



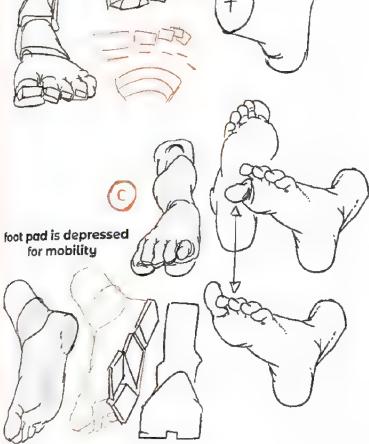
### tie toes

The toes themselves are wedgeshaped, not rectangular, and the big toe angles in toward the other toes, not running parallel with the foot (A) in fact, all the ties, like the fingers, are angled inward to a degree. They also overlap more as you progress toward the little toe, which is rolled almost

completely under, providing the benefit of stability (B) The pad of the front of the foot has a depression in the center, to allow the foot to bend and fold along its length (C). Visualize each toe as two flattened forms, to capture its grasping nature (D)

increasing overlap toward little toe



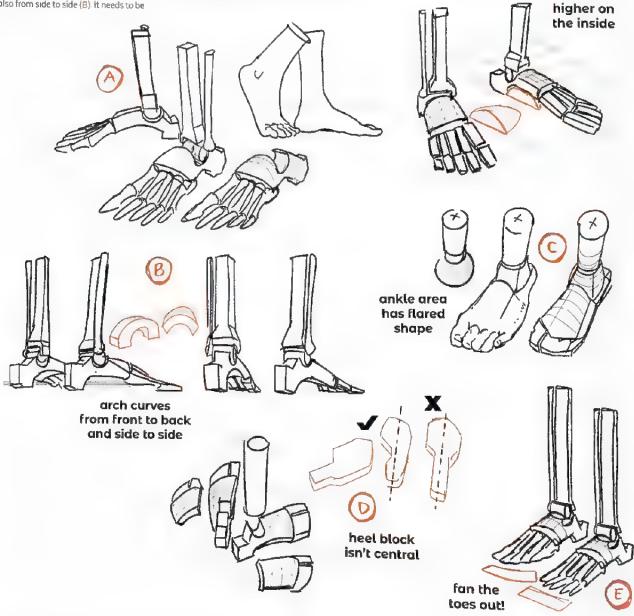


# refining the foot

The arch of the foot is higher on the inside than on the outside. The outer edges of many people's feet are in full contact with the ground (A). The arch—that the leg transitions into the foot doesn't just run from front to back, but also from side to side (B). It needs to be

strong enough to withstand the force of impact while running and jumping The ankle region itself flores out, so via a kind of wedge (C). The calconeus (heel bone) is offset - it doesn't run centrally down the foot, but sits more toward the outside (D). The toes fon out and back, rother than being parallel (E)

the arch is



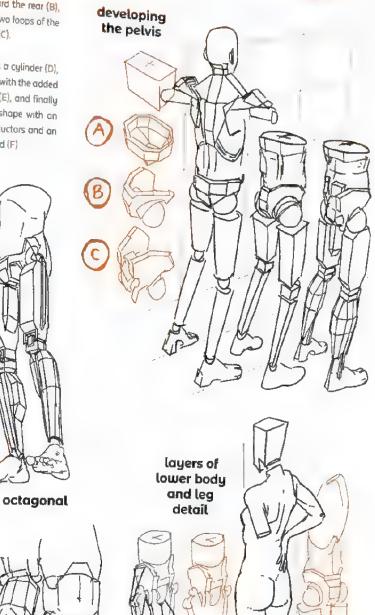
# wer body summary

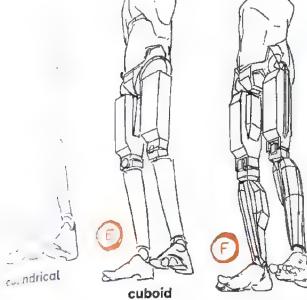
the lower body's , levels of detail. \_\_\_\_, it cary less t be mony interna should mostly be ette

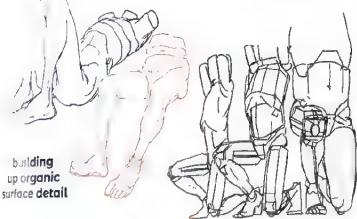
m for the pelvis, nue pants r erst ons of rapted this

so that it tapered toward the rear (B). and finally added the two loops of the ischio to the underside (C).

The upper leg began as a cylinder (D), which became a cuboid with the added block form of the knee (E), and finally became an octagonal shape with an inner wedge for the adductors and an outer strip for the IT band (F)









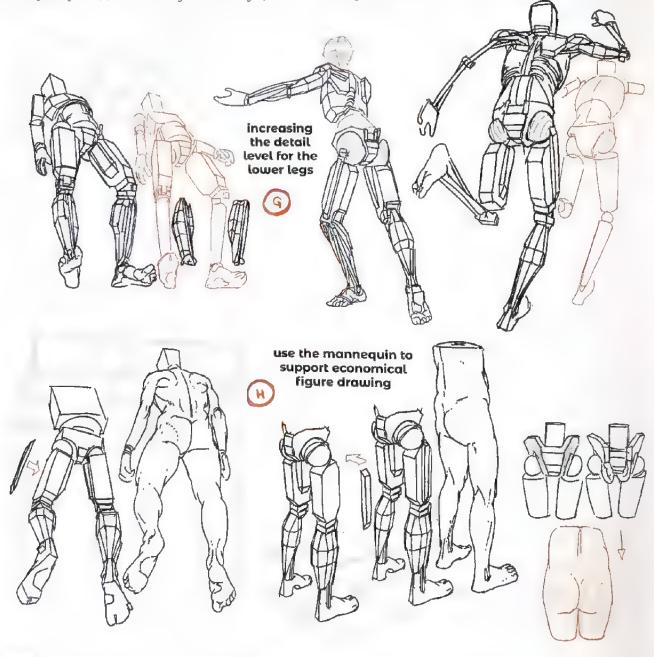
Here are a few more examples of our mannequin with improved legs and waist. We developed the lower legs to a higher level of detail, but notice how their topered shape was evident even when they were cylinders (G)

As with every section of this book, we mustn't lost sight of the fact that the goal is a figure drawing, not a mechanical model. The mannequin gives us a framework to build on, but the goal is to draw a figure, not a series

of parts. The mannequin is simply a tool to enhance our figures by giving them a strong working foundation (H)

So, draw out your mannequin, and add any extra individual muscles you

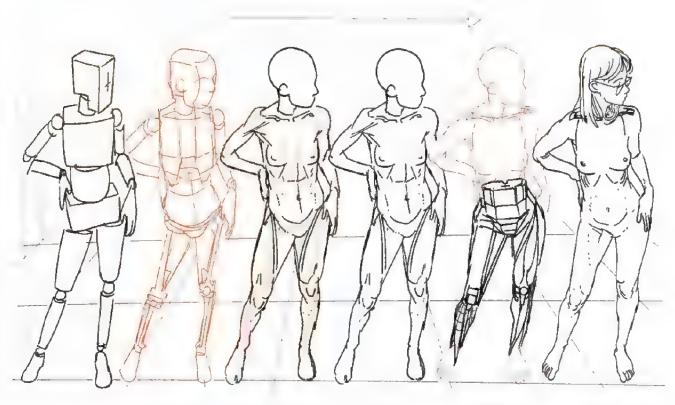
feer will help you outline the figure After this, try to describe these forms as economically as possible, using the manneguin as an underdrawing



# building up an example figure

Now let's see an overview of building up a whole figure. I begin with the box mannequin, then build up to the more advanced mannequin On top of this. muscles in the softer regions like the core and glutes. If I'm unsure about on area, I build up the leve of detail to

clarify the structure. Finally, I draw the smaller details and cranfy any overlaps within the silhouette Throughout, I keep in mind the subtle details that will I draw the silhouette, including any elevate the figure, depending on the viewing angle, such as body fat and the thickness of the limbs if they are flexed or twisted



box mannequin

advanced mannequin muscles and soft tissue

lines so far! checking structure

fine details and line overlaps

### over to you...

Good drawing doesn't require complex methods. You just need to slow down and pay attention to the core skills. The techniques we've covered in this book are simple. However, it's important not to confuse "simple" with "easy." Remembering to practice them and ultimately make them intuitive will take work

As you draw, constantly remind yourself of the techniques we've covered:

- Simplification
- Think in X, Y, and Z
- Overlap lines and forms
- Less is more
- Dare to foreshorten
- Wedging:
- Cross contours
- Level of detail

Ask yourself, "Am I looking up or down at this subject?" and "Is this level of detail appropriate for me?" Answers to questions like these are real-time feedback mechanisms. Most people seeing your drawings don't know your objectives or thought processes, and so can't provide much

tonstructive feedback. Even if you have a great teacher; they wan't always be around, so remember: The best learning resource is you, the artist. Any time, day or night, you'll be available to give yourself feedback. Learn to provide yourself with positive, helpful critiques.

Imagine being able to honestly reflect on the weaknesses in your work without being overly critical or believing the outcome is linked to your personal worth. If you achieve that, your artistic growth will have no limits,

Finally, remember to enjoy yourself. Anyone can learn critical thinking skills, but to analyze your work without judging yourself too harshly – that's the real challenge! Ultimately, people draw because of the way it makes them feel. Don't lose sight of that sense of playfulness and curiosity.

### tom fox

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### glossary

#### abd

The action in the order port outward awarfs of enterine of the body

### abdu eis brevis

One of the less of the laboures the thumb and formed in model base in the palm.

#### acetabulum

The round socket in the side of the pelvis, into which the ball of the femur inserts, forming a boll-and-socket joint

#### achilles tendon

Also called the "calcaneal tendon" The tendon at the back of the lower leg, connecting the calf muscles to the heel bone and helping to move the foot.

#### acromion process

A hom-shaped piece of bone that extends from the spine of the scapula and helps connect the scapula to the clavicle.

#### adduction

The action of moving a body part inward, toward the center line of the body.

#### alar cartilage

The flexible cartilage forming the lower part of the nose, around the nostrils, consisting of various larger and smaller cartilage pieces

#### anterior

Something that is in front of ar nearer to the front of a body part

#### anterior superior iliac spine

Also called the ASIS. The distinct bony point at the top of the lirac crest of the pelvis.

#### antinelix

A curved, raised form on the ear it sits within the helix and often has a "Y" shape

#### biceps

The large, two-headed muscle on the front of the upper arm, used for flexing and twisting the lower arm

#### brachialis

A muscle that sits on the lower end of the upper arm, below the piceps, and is essential for flexing the lower arm.

#### brachioradialis

A muscle that sits on the forearm, near the elbow, and helps flex and twist the forearm.

#### calcaneus

The heel bone - the largest bone in the faot!

#### carpals

A cluster of small bones that attaches to the end of the lower arm, forming the basis of the hand

#### clavicle

Also called the collarbone. A thin bone that sits at the front of the body, between the neck and shoulder, and is one of a pair.

#### coracoid process

A small, finger-shaped part of the scapula, which helps connect it to the shoulder area

#### core

The middle area of the torso, roughly including the abdomen, mid-back, and lower back

#### deltoid

A major muscle that wraps around the glenohumeral joint and gives the shoulder its distinctive round shape

#### distal

Something that is farthest away from the center or origin of a body part. For example, the distai phalange is the phalange forming the very end of the finger

#### dorsiflexion

The action of flexing or bending a body port to point upward - typically referring to the foot

#### ear canal

The tubelike inner part of the ear, leading down into the skull

#### earlobe

The soft lower part of the outer ear On some people, it hangs down in a curve, while on others it attaches directly to the side of the head

#### epicondule

A bony projection that can be found on various parts of the body, but in this book is usually referring to the epicondyles of the humerus

#### eversion

The action of turning something to face outward, such as turning a foot sideways to face out.

#### extension

The action of straightening out a limb or body part, as apposed to bending (flexing) it.

#### extensor

A muscle that helps straighten a limb or body part, such as the extensor digitarum (which extends the finger) or the extensor pollicis brevis and extensor pollicis longus (which extend the lower arm).

#### femur

The thigh bone - the largest bone in the bodul

#### fibula

The thinner, outer bone of the two lower legiones.

#### flexion

The action of bending a limb, as opposed to straightening it (extension)

#### flexor

A muscle that flexes (bends) a limb or body part.

#### frontal bone

The large, curved skull bone that forms the forehead, brow ridges, and upper parts of the eye sockets

#### gastrocnemius

The large two-headed muscle on the back of the lower leg, forming the distinctive shape of the calf.

#### glenohumeral joint

The ball-and-socket joint of the shoulder, formed by the humerus fitting into a socket in the scopula.

#### gluteal muscles

Often nicknamed the "glutes." A group of three muscles (the gluteus minimus, medius, and maximus) that forms the buttock.

#### hamstring

One of the three muscles at the back of the thigh, running from the ischium down to the knee area

#### helix

The firm ridge forming a rim around the top and outer edge of the ear.

#### humerus

The upper arm bone.

#### huold bone

A small, horseshoe-shoped bone that floats below the lower jaw and gathers the neck muscles together.

#### iliac crest

The bony ridge running along the top of the ilium (the wing of the pelvis).

#### iliacus

A flot muscle that covers the inside face of the irum.

#### iliotibial tract

Also called the iliotibial band or "IT band." A long, thick band of tissue that runs down the outside of the thigh and supports the knee.

#### ilium

One of the large, curved hip bones that create the distinctive wings of the pelvis.

#### inguinal ligament

A grain ligament that runs from the ASIS to the pubis, helping protect the tissues in the lower abdomen

#### inversion

The action of turning something to face nward (for example, turning the feet so their soles face inward).

#### ischium

Sometimes nicknamed the "sit bone." One of the two curved bones (ischia) on the underside of the pelvis. The ischium connects to the publis to form a loop shape.

#### lateral

Something that's situated on, near, or toward the side of something else.

#### latissimus dorsi

Often nicknamed the "lats." A large, flat muscle that attaches to the inner humerus and runs down the back to the pelvis

#### levator scapulae

A muscle at the back of the neck that raises the scapulae

#### ligament

A band of strong tissue that connects a bone to another bone (similar to a tendon, which connects muscle to bone).

#### lumbar

Relating to the lower back area, such as the lumbar vertebrae of the spine.

#### mandible

The lower jaw bone, containing the lower teeth and giving form to the chin and jawline.

#### masseter

A thick muscle on the side of the mandible, assisting in closing the jaw.

#### maxilla

A skull bone comprising the upper jaw and most of the mid-face area, including some nasal bones, parts of the lower cheeks, and the upper teeth

#### medial

Something that's situated in or near the middle of the body or body part.

#### metacarpal

One of the five thin banes attached to the carpais, forming the bases of the thumb and fingers within the palm area of the hand.

#### nasal bone

A bone that forms the bridge of the nose, providing a base for the nasal cartilage

#### oblique

One of the muscles on the side and front of the abdomen, such as the external oblique and interno oblique muscles.

#### accipital bone

The scoop-shaped bane that forms the bottom rear of the skull, with a hole in it for the spine to pass through

#### occipitofrontalis

A wide, flot muscle that covers the top of the skull, moving the eyebrows and forehead

#### olecranon

The prominent end of the ulna that forms the bony point of the elbow.

#### patella

Also called the kneecap. A small, rounded bone that sits in front of the knee joint

#### phalange

The individual bones forming the segments of the fingers and thumbs, with three phalanges per finger and two per thumb

### pronation

The action of rotating a body part outward, away from the center of the body (for example, turning the hand palm down)

### psocs

A deep muscle connecting the lower spine to the femul, helping the body to bend and the leg to lift

### pubis

Also called the pubic bone. One of the pair of bones that forms the very front of the pelvis.

### quadratus lumborum

Often called the QL. A deep muscle that connects the lower spine to the illium, helping the body to bend sideways

### quadriceps femoris

Often nicknamed the "quads." A muscle group of the upper leg, including the vastus medialis, vastus intermedius, vastus lateralis, and rectus femoris.

#### radius

The shorter of the two bones forming the lower arm, widening toward the hand

### rectus abdominis

Often nicknamed the "abs." A long, flat paired muscle that runs down the front of the obdomen and helps flex the body.

#### rhomboid

A muscle connected to the scapula in the upper back, where it helps move the shoulder and arm

#### sacrum

The large, strong triangular bone at the base of the spine, forming the back of the pelvis.

#### sartorius

The long, narrow muscle that runs down the upper leg, from the top of the thigh to the tibia.

#### scapula

Also called the shoulder blade. A large, wingshaped bone that sits on the upper back and is one of a pair

#### serratus anterior

A muscle that connects the ribs to the scopula in a distinctive senes of triangular forms

#### soleus

A strong muscle on the back of the lower leg, helping to flex the foot

#### spine of the scapula

The prominent bony ridge found on the scapula.

#### sternocleidomostoid

The thick, diagonal muscle that runs down either side of the neck

#### sternum

Also called the breastbone. A long bone at the front of the rib cage, connecting the ribs together in the middle of the chest.

#### supination

The action of rotating a body part up and in toward the center of the body (e.g. turning the hand palm up)

#### temporalis

A large, flat muscle on the side of the head, which heips move the mandible.

#### tendon

A strong band of tissue that connects a muscle to a bone.

#### tensor fasciae latae

Often called the TFL. A long, thin muscle running down the outside of the thigh, heiping to extend the knee

Also called the shin bone. The larger of the two lower leg bones, running from the knee to the ankle.

#### tibial tuberositu

A bony landmark near the top of the tibia, creating a noticeable bump below the kneecop

#### tragus

A small, firm cartiloginous form at the front of the ear, joining to the side of the head

#### transversus abdominis

Often called the TA A wide sheet of muscle that wraps around each side of the abdomen. supporting the spine and pelvis

#### trapezius

A large, triangular muscle at the top of the back, between the scapulae and running up the back of the neck, where it helps move the head and shoulders

#### triceps

The three-headed muscle on the back of the upper arm, where it helps with extension

#### trochanter

A rough, bony lump on the femur, to which muscles can attach. The femur has a greater trochanter on the outer side and a lesser trochanter on the inner side

#### ulna

The longer of the two bones forming the lower arm, widening toward the elbow

#### vertebra

One of the bone segments that forms the spine and surrounds the spinal cord

#### zygomatic bone

A facial bone comprising the upper cheek and lower part of the eye socket

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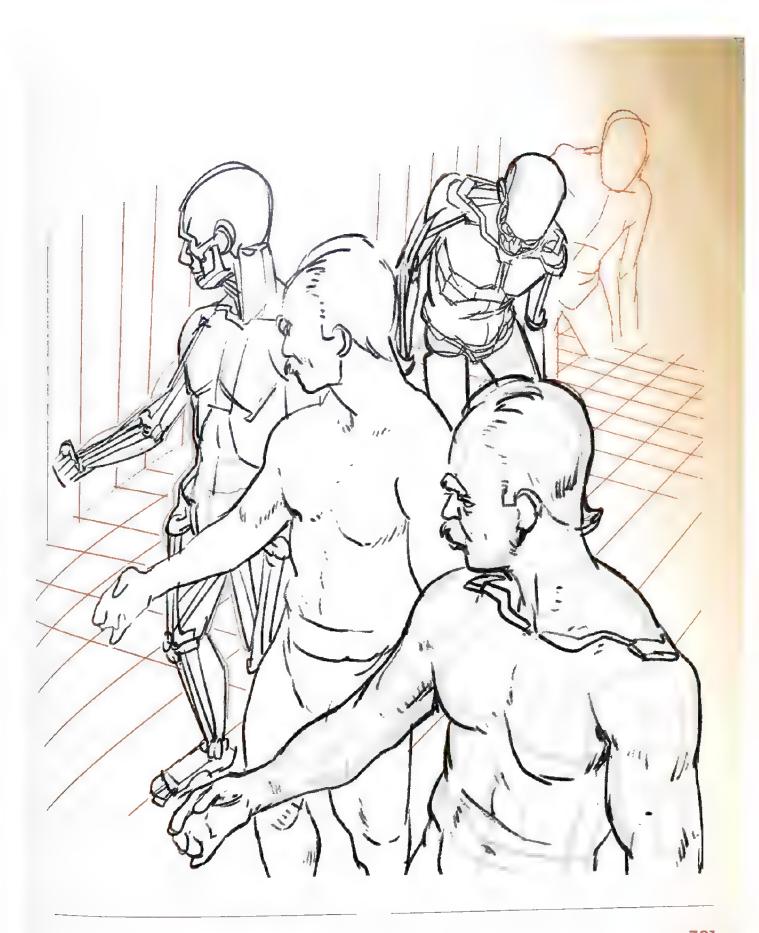
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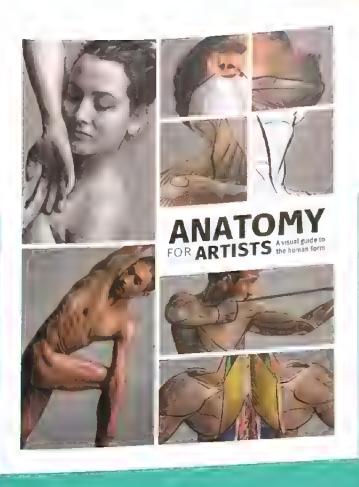
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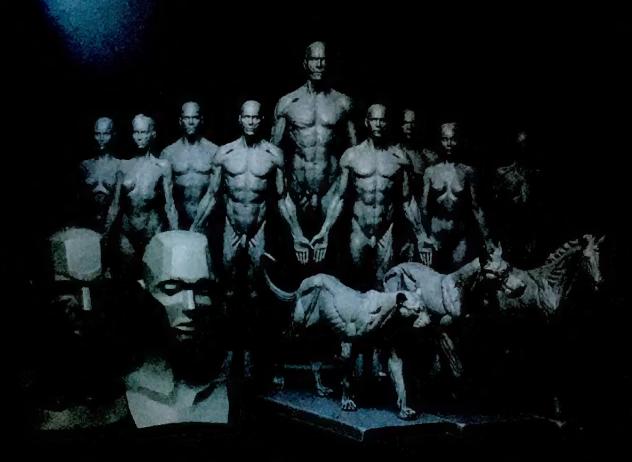




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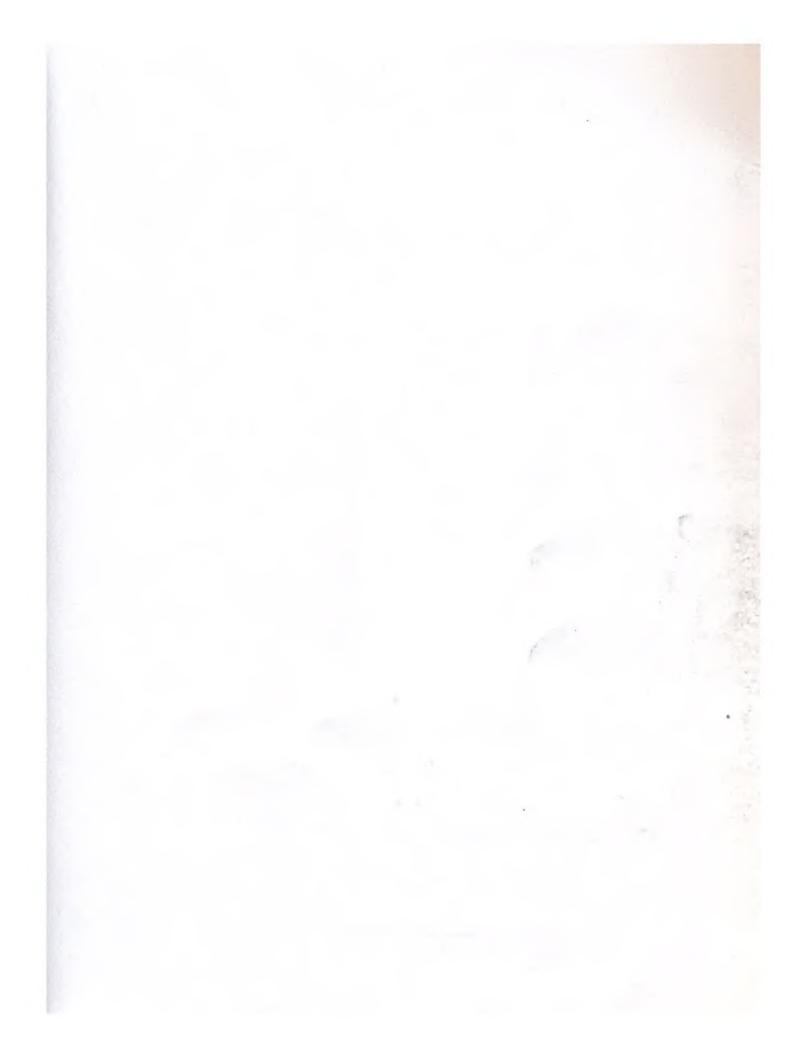
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